FISCAL YEAR 1990
DEPARTMENT OF ENERGY AUTHORIZATION
(Uranium Enrichment)

HEARING

BEFORE THE

SUBCOMMITTEE ON
ENERGY RESEARCH AND DEVELOPMENT

OF THE

COMMITTEE ON
SCIENCE, SPACE, AND TECHNOLOGY
HOUSE OF REPRESENTATIVES

ONE HUNDRED FIRST CONGRESS

FIRST SESSION

FEBRUARY 22, 1989

[No. 24]

VOLUME III

Printed for the use of the
Committee on Science, Space, and Technology

U.S. GOVERNMENT PRINTING OFFICE
99-663 WASHINGTON : 1989

H701-77

For sale by the Superintendent of Documents, Congressional Sales Office
U.S. Government Printing Office, Washington, DC 20402

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1990 DEPARTMENT OF ENERGY AUTHORIZATION

WEDNESDAY, FEBRUARY 22, 1989

U.S. House of Representatives,
Committee on Science, Space, and Technology,
Subcommittee on Energy Research and Development,
Washington, DC.

The Subcommittee met at 1 p.m., in Room 2318, Rayburn House Office Building, Hon. Marilyn Lloyd, Chairman of the Subcommittee, presiding.

Present: Representatives Lloyd, Wolpe, Fawell, Henry, Morrison and Smith.

OPENING STATEMENT OF HON. MARILYN LLOYD, CHAIRMAN, SUBCOMMITTEE ON ENERGY RESEARCH AND DEVELOPMENT

Mrs. Lloyd. The Subcommittee on Energy Research and Development will come to order. Good afternoon ladies and gentlemen.

Before we proceed, I do ask unanimous consent that today's proceedings be allowed to be recorded by the media. And, without objection, so ordered.

This afternoon, we are going to receive testimony on a very important government business enterprise. The Department of Energy will explain the President's request for the uranium enrichment program which enriches uranium for the Government's nuclear navy and many domestic and foreign nuclear powerplant owners.

The business, therefore, serves vital energy security and national security objectives, while at the same time provides significant sums to offset the Nation's trade imbalance in other areas. And, in my view, whatever we can do to make this business successful, I think we should do as a Congressional body. I think it is too important for us to do otherwise.

The administration has again proposed the formation of the U.S. Uranium Enrichment Corporation and promises to submit legislation to the Congress to achieve this purpose. I have been made aware of the significant funding limitations that are applicable only because the business is operating within the overall budget of the Federal government.

Basically, these limitations stem from the inability of the business to raise capital and to make expenditures independently from the broader issues which affect the spending of the federal government. I have long supported a revolving fund for the uranium enrichment business even when the Department of Energy opposed the idea. It is clear to me that an enrichment corporation would be an alternative to the revolving fund and perhaps might conceivably provide more flexibility than the revolving fund.

However, a revolving fund might be considerably less expensive to the program in both time and money, considering that, with a revolving fund, a whole new organization will not have to be formulated to accomplish the enrichment mission. The tradeoffs will eventually have to be discussed in more detail.

The President's budget request includes $148 million dollars for the Atomic Vapor Laser Isotope Separation process. This level of commitment is a significant improvement in the Office of Management and Budget's attitude toward the enrichment business; $148 million could very well be sufficient for the program, considering the accelerated demonstration program the Department of Energy has instituted for this technology.

I do note, however, that $148 million is $20 million less than that recommended in the deployment plan, Option Number 3, provided to this committee last year by Dr. Emmett, the former Program Manager at the Lawrence Livermore National Laboratory. Additionally, Dr. Emmett had recommended three million dollars for fiscal year 1990 to initiate the design of the production plant facility.

As I understand it, this request before us today includes no funding request for the production facility. We will want to explore these funding questions with the Department of Energy, the Livermore Laboratory, and the Oak Ridge National Laboratory. If further funds are required for this or other business activities of the enrichment program, we will not hesitate to utilize all of the revenues from the business to properly operate the business.

Additionally, it seems to me that it is past time to select a contractor and a site for the deployment of the AVLIS technology. And, I trust that DOE will want to comment on this as well.

I would at this time like to recognize the distinguished ranking Republican member of the committee, the Honorable Sid Morrison, who is my dear friend and colleague and certainly works very hard on this committee in serving both his district and the United States.

Mr. Morrison.

OPENING STATEMENT OF HON. SID MORRISON, RANKING REPUBLICAN, SUBCOMMITTEE ON ENERGY RESEARCH AND DEVELOPMENT

Mr. MORRISON. Thank you very much, Madam Chairman. I look forward to this afternoon's hearing.

We have spent quite a bit of time on uranium enrichment, and it has been a fascinating story as it has unwound in recent years. And, we always look forward to the next chapter and trust that it will be satisfactory.

As I have looked at these efforts, consolidation and facilities and reduction and production costs, I have to say we are moving very, very positively. And, I know that as we considered last year, we had three different House bills regarding the establishment of the

Uranium Enrichment Corporation. And, the budget look at it, at this issue, will just be adding to that.

So, thank you very much, Madam Chairman.

Mrs. **Lloyd**. Thank you very much, Mr. Morrison. Are there other Members that would like to make opening statements?

Mr. Wolpe.

Mr. **Wolpe**. Madam Chairman, I thank you very much. Let me first express my appreciation to you for calling this hearing at this early phase of this new session. It is obviously one of the more important questions that this Committee must address.

I am delighted to be back on the committee. And, I've got some catch-up to do——

Mrs. **Lloyd**. We welcome you back on the committee.

Mr. **Wolpe**. Well, it's good to be here. And, if I may kind of just thrust some questions that I have as it relates to the testimony we are about to receive that I hope might be addressed by Mr. Sewell this morning—this afternoon rather.

There are a number of puzzling features about the budget that is being proposed for uranium enrichment if I understand this correctly. As I understand it, the budget is predicated on a writeoff of the approximately $10 billion in so-called unrecovered costs or debt of the program to only 364 million dollars. That write-off is contrary to the full cost recovery requirement in the existing law, as I understand that law.

Further, the Agency proposes not to recover any of the $364 million but instead to pay only $29 million interest on that sum.

Only two years ago, the DOE in the Federal Register professed confidence that it could recover at least three and a half billion dollars of the $10 billion only under current law. And, I guess I would hope we might understand why we should now settle for one-tenth of that amount and why the civilian uranium enrichment program has, in fact, been such a loser.

The other broad question I would have relates to the cost to decommission DOE's three enrichment plants, which I understand are estimated to be at least $3 billion. DOE has recovered none of these costs. Until it does, they presumably will all fall to taxpayers.

The DOE budget proposes a recovery of only $40 million of the amount required, and that amount seems trivial in comparison to the amount actually required. So, I guess I would like to—I hope we might hear this afternoon why DOE does not seek to recover a more significant amount, especially since it has recovered nothing to date.

Since its inception, the civilian uranium enrichment program was supposed to pay all of its costs, direct and indirect. And, there was supposed to be no taxpayer subsidy whatsoever.

As contemplated in the fiscal year 1990 budget, as I understand it, taxpayers will likely end up paying more of those costs than DOE's customers. And, it seems to me at least that something is rather awry.

I raise all of these questions obviously in the context of the extraordinary difficult budget decisions we have to make this year with the deficit and all that is hanging in front of us.

DOE has recently announced that more than $80 billion will be required to clean up environmental damage from its various programs. Other estimates run as high as $200 billion. And, I guess the question is why all the money to taxpayers and the civilian uranium enrichment program should be written off?

It's simply not clear to me. And, I hope that those questions might be addressed this afternoon.

Thank you very much.

Mrs. LLOYD. Thank you, Mr. Wolpe. Are there other Members that would like to have comment?

[No response.]

Mrs. LLOYD. Well, our first witness this afternoon is Mr. Philip Sewell, the Deputy Assistant Secretary for Uranium Enrichment at the Department of Energy.

Mr. Sewell heads up the uranium enrichment program. We understand he is most conversant with all the business requirements of the enterprise.

We do welcome you today, Mr. Sewell. Your written statement will be made a part of the record. And, you may proceed or summarize however you wish.

STATEMENT OF PHILIP G. SEWELL, DEPUTY ASSISTANT SECRETARY FOR URANIUM ENRICHMENT, DEPARTMENT OF ENERGY

Mr. SEWELL. Thank you. Good afternoon, Madam Chairman. It's a pleasure to be here today to discuss the key elements of the uranium enrichment enterprise. Thank you for the opportunity to present the Department of Energy's views and position concerning this important national asset.

As indicated in our fiscal year 1990 budget submission, the administration proposes to establish a wholly owned Government corporation for uranium enrichment in order to create a financially healthy, competitive U.S. enrichment enterprise for the long term, one that can maximize a return on investment in enrichment to the taxpayer.

Uranium enrichment is a vital component of the role that nuclear power plays in the United States today. It has a high strategic value and serves a vital national interest.

Today, about 20 percent of the electricity is generated from nuclear powerplants. The uranium enrichment enterprise provides fuel to these powerplants, thereby supporting a strong, more secure energy future, one that is free of supply disruptions and arbitrary price changes.

Enrichment also contributes to key national security interests. In fact, about 40 percent of the U.S. Navy's active combat fleet depends on enriched uranium from the Department of Energy.

Finally, with about $500 million in foreign enrichment sales each year, the enrichment enterprise helps improve the Nation's balance of trade position.

To insure that these important national interests are most effectively met, we are proposing to restructure enrichment as a Government-owned corporation. The Department will be submitting legislation to Congress for this purpose in the next several weeks.

In general, the reasons why we prefer a Government corporation to a Government-managed program is that we believe that it can be, and will be, more profitable, more business-like, more flexible and more competitive. We believe it can be more profitable because it can—it has a greater ability to return the investment in enrichment back to the taxpayer. It can generate a positive cash flow of about one billion dollars by 1995 that can be returned in the form of dividends to the U.S. Treasury.

By 1995, we believe the corporation can have a strong future earnings potential that will enhance the value of this enterprise and potentially generate several billions of dollars from the sale of stock of this corporation. Even a well managed and a highly motivated government program would not be expected to generate equivalent returns on investments until years later.

We believe that a Government corporation can be more business-like because it has one key characteristic, a profitmaking objective. That objective serves as a strong motivator for a commercial entity in a competitive marketplace. This motivation results in more effective marketing to optimize sales. It also provides greater emphasis on reducing, that is minimizing, costs.

The profitmaking objective we believe will provide an opportunity to maximize the future market strength of this enterprise and provide a higher return on investment.

A second characteristic in terms of making it—in terms of it being more business-like is a greater focus and attention by management. That is, greater focus and attention without the distraction of other strong, equally important interests in other areas of significant concern in the energy area.

Finally, in terms of business-like characteristics, a corporation can have a self-financing requirement in order to engender greater financial discipline that would balance capital risk versus market gain; and, therefore, provide for a more prudent investment decisionmaking process.

We believe that a corporation can be more flexible and more competitive. Basically, a corporation is endowed with more commercial characteristics and, therefore, able to adapt to market changes and individualized customer concerns.

A vivid example of this need exists today. We now expect $153 million more in sales in 1989 than we projected in our 1989 budget. And, we also have the opportunity this year to buy inexpensive power this Spring, produced at about $30 per SWU. That is about 30 percent or less of our existing price; and, thereby, save $2 in 1990 for every $1 we spend this spring.

The problem we have as a Government-managed program is that we do not have the budget authority to meet these higher sales and address the opportunity of realizing savings from buying inexpensive power because of the budget authority limitation in our appropriation bill.

We will be requesting a non-fund supplemental appropriation from Congress in the near future. But, the prospect of passage by Congress in time are not great in terms of realizing the greatest potential benefit from this opportunity facing us today.

With a Government corporation, this type of flexibility would exist, with the ability to take competitive steps quickly and effectively. This is only one of the reasons why we strongly support the establishment of a Government corporation.

Again, the primary basis on which we believe that a government corporation is preferable to a government managed program is that it can be and should be and will be more business-like, more competitive, more flexible and, therefore, the bottom line, more profitable.

I would like to quickly highlight some of the primary elements associated with our fiscal year 1990 budget. The fiscal year 1990 budget submission represents a financial prospectus designed to meet commercial and defense needs for enriched uranium, to also responsibly ensure safe, environmentally sound operations, and to pursue the completion of the highly promising laser enrichment technology program.

In general, we believe the fiscal year 1990 budget strengthens the enrichment enterprise and helps ensure a financially healthy and competitive entity. In 1990, the production levels of the enrichment enterprise will increase, increase by almost a factor of two in order to match our sales. In 1989, we will have depleted all of our product inventories, such that production will have to match sales in 1990 and thereafter.

A major cost component in our 1990 budget is a payment to TVA of $311 million for power not used or demand charges. From 1991 through 1994, we will make annual payments of $160 million to TVA, and after 1994 no further payments will be made for this liability.

Our budget also reflects a strong commitment to protect the public and the environment while conducting uranium enrichment activities. It includes funds for environmental restoration activities at the two operating GDPs and also at the Oak Ridge Gaseous Diffusion Plant that has been shut down since 1985.

Actually, Oak Ridge—the Oak Ridge Gaseous Diffusion Plant is in the first stage of the D&D or decontamination and decommissioning process. That basically consists of the removal of hazardous materials and surface radioactive contamination of the equipment.

And, we plan to put the Oak Ridge Gaseous Diffusion Plant in a safe storage standby condition by the completion of this first phase of D&D by 1994.

We also project that we will spend about 500 million dollars through 1995 for environmental restoration activities at all three gaseous diffusion sites. This includes the closeout and cleanup of gas centrifudge facilities at Oak Ridge and Portsmouth and increased on-site and off-site groundwater decontamination activities.

The budget also includes the establishment of a D&D fund to address this responsibility once the enrichment plants are closed. Basically, the budget calls for the establishment of an interest-earning fund in the U.S. Treasury with a deposit of $40 million in 1990 and 50 million dollars for every year thereafter. We estimate that this process will accumulate funds of up to $1.5 billion by the year 2005; 2005, the year in which we expect the two operating gaseous diffusion plants to be shut down and when D&D, that is decontamination and decommissioning, activities should commence.

The 1.5 billion dollars represents the commercial portion or 50 percent of the total D&D liability that is estimated at our gaseous diffusion plants. That total liability is estimated at $3 billion. Revenues going into that—monies going into that fund will be collected from revenues from commercial customers, such that their share, their equitable share, of that D&D liability will be collected prior to the responsibility for discharging that liability.

Finally, the fiscal year 1990 budget also supports the demonstration of the AVLIS technology. By the end of 1991, the calendar year 1991, this budget is designed in order to complete demonstration at that time, in order to determine the economic and technical value of the AVLIS technology, and to conduct activities that are necessary to ensure the transition to a commercial plant can be timely and successful.

Basically, the 1990 activities will focus on demonstration of the AVLIS technology and, in addition, the integration of industrial experience into the AVLIS RD&D program to optimize transition to commercial application. We believe an industrial integration is essential to the successful transition of AVLIS beyond the R&D phase, beyond the laboratory and into the marketplace. We plan to start this process of industrial integration this year.

The Administration is strongly committed to the completion of the AVLIS RD&D program. We believe that AVLIS is a key component of those actions necessary to ensure the future competitiveness of the enrichment enterprise.

We also believe that a Government corporation with a strong mission and a strong business orientation can effectively manage the AVLIS program to maximize its market potential.

In summary, the administration's goal is to establish a healthy and competitive enrichment enterprise, one that is able to return to the taxpayer those amounts that maximize the recovery on investment. We propose to restructure enrichment as a Government-owned corporation as the best means to accomplish that purpose.

We feel that timely and decisive action by Congress is needed. And, we are eager to work with you to refine details to complete this legislative initiative.

We appreciate this committee's support in the past of the enrichment enterprise and request your continued cooperation in assuring its future health and vitality.

Thank you. I will be pleased to answer any questions at the appropriate time.

[Complete statement follows.]

[The prepared statement of Mr. Sewell follows:]

STATEMENT OF
PHILIP G. SEWELL
DEPUTY ASSISTANT SECRETARY FOR URANIUM ENRICHMENT
BEFORE THE
HOUSE COMMITTEE ON SCIENCE, SPACE AND TECHNOLOGY
SUBCOMMITTEE ON ENERGY RESEARCH AND DEVELOPMENT
FEBRUARY 22, 1989

URANIUM SUPPLY AND ENRICHMENT ACTIVITIES

The mission of the Uranium Enrichment Enterprise is to provide uranium enrichment services to domestic and foreign commercial customers as well as for defense requirements in support of national policy objectives, consistent with the Atomic Energy Act.

The funds requested in FY 1990 for this major activity are identified in the following tables:

Program Element	Budget Authority ($ in Millions) FY 1989 Appropriation	FY 1990 Request
Uranium Enrichment Activities		
Gaseous Diffusion Operations and Support.....	$ 1,013.0	$ 1,241.4
Atomic Vapor Laser Isotope Separation........	127.0	148.0
Environmental Restoration...................	32.6	50.5
Program Direction...........................	4.0	5.1
Uses of Prior Year Balances.................	-43.5	0
Subtotal, Uranium Enrichment Activities..	1,133.1	1,445.0
Contributions to Decontamination and Decommissioning (Clean-up) Fund (Proposed).	N/A	40.0
Payment to Treasury on Debt (Proposed).......	N/A	29.0
Subtotal, U.S. Uranium Enrichment Corporation...........................	N/A	1,514.0
Uranium Enrichment Revenues....................	-1,374.0	-1,514.0
SUBTOTAL................................	-240.9	0
Transfer to the Corporation (Proposed).........	240.9	0
TOTAL..................................	$ 0	$ 0

Program Element	Budget Outlays ($ in Millions) FY 1989 Appropriation	FY 1990 Request
Uranium Enrichment Activities		
Gaseous Diffusion Operations and Support.....	$ 1,067.1	$ 1,241.0
Atomic Vapor Laser Isotope Separation........	127.0	148.0
Environmental Restoration....................	67.2	50.5
Program Direction............................	5.1	5.1
Cost/Outlay Adjustment.......................	-4.7	.4
Subtotal, Uranium Enrichment Activities..	1,261.7	1,445.0
Contributions to Decontamination and Decommissioning (Clean-up) Fund (Proposed).	N/A	40.0
Payment to Treasury on Debt (Proposed).......	N/A	29.0
Subtotal, U.S. Uranium Enrichment Corporation............................	N/A	1,514.0
Uranium Enrichment Revenues..................	-1,374.0	-1,514.0
NET OUTLAYS..............................	-112.3	0

The Uranium Enrichment Enterprise is vital to U.S. energy security and national security requirements. Nuclear energy currently provides one-fifth of our Nation's electric power and will play an important role in the environmentally sound expansion of our supply of electricity in the future. A secure and economical domestic supply of enriched uranium frees the United States from threats of foreign supply disruptions or price controls. While helping the trade balance with about $500 million in annual sales abroad, the Enterprise's involvement in the international nuclear fuel cycle promotes U.S. nonproliferation efforts. Finally, a safe, dependable supply of highly enriched uranium for U.S. naval forces supports important national security objectives. To ensure that the nation's national defense and energy security interests are met on the most effective basis, the Uranium Enrichment Enterprise needs to be both competitive and financially healthy.

Since the mid 1980's, the Uranium Enrichment Enterprise has taken steps to re-establish its competitive position by dramatically reducing operating costs, by eliminating unneeded facilities, by improving the efficiency of existing equipment, by reducing its inventories of natural and enriched uranium, and by focusing its R&D efforts exclusively on laser technology. These improvements have enabled DOE to maintain its position as the largest supplier in a very competitive world market. To ensure that it remains the supplier of choice in a highly competitive market, DOE has increasingly emphasized quality, customer service, and competitive pricing for long-term supply.

The success of these efforts is probably best demonstrated in the contract extension notices of last year. On April 1, 1988, customers representing almost 90 percent of DOE's enrichment volume extended their base commitments for the full 10 year term of their contracts. These actions provide DOE with a substantial and stable sales base for the future.

Despite the progress that has been achieved over the last several years however, the long-term survival of the Uranium Enrichment Enterprise requires that it be permitted to operate in a more commercially-oriented manner to fulfill its mission most effectively and provide the greatest return to the taxpayers. To accomplish that purpose, the Administration plans to submit legislation to Congress to establish a Government-owned, self-financing corporation for uranium enrichment. Legislation would create a competitive, well-managed, and efficient enterprise that would enhance national security; maximize return to the taxpayer; instill customer confidence in the enterprise as a reliable, economical, long term supplier of enrichment services; enhance the value of the Government's investment; and improve the prospects for transfer to the private sector.

A new profit-making Government-owned corporation would:

- o Allow the business to plan for the long term. The corporation would be self-financing with the spending plan for production and for new facilities based upon the most efficient use of resources over the long term instead of being constrained by annual appropriations.

- o Resolve a question concerning the amount to be repaid to Treasury for the Government's investment in uranium enrichment by: repaying the Treasury an initial debt of $364 million over 10 years, issuing to the Government stock equal to the book value of the enterprise, and paying dividends on the stock to the Treasury.

- o Provide financing for the eventual decommissioning of the current enrichment facilities by paying into a sinking fund. At the time of clean-up, the amount in the sinking fund would be matched by contributions from DOE's Defense Programs to pay for decommissioning.

The Administration believes that the proposed Uranium Enrichment Corporation would be an excellent candidate for privatization in the future. In the meantime, the corporation would issue private-sector-type financial statements, to establish a record that could be evaluated by financial institutions.

GASEOUS DIFFUSION PLANT OPERATIONS

The enrichment enterprise meets customer requirements for enriched uranium from its gaseous diffusion plants (GDPs) in Paducah, Kentucky and Portsmouth, Ohio. Martin Marietta Energy Systems (MMES) operates both of these Government-owned production facilities.

During 1988, the GDPs operated at a combined average power level of 1,549 megawatts, compared to a combined full capacity level of 5,300 megawatts. Total separative work unit (SWU) production was 5.95 million SWUs. Electric power is supplied to both GDPs under long-term contracts. Electric Energy, Incorporated (EEInc) supplies power to the Paducah plant and the Ohio Valley Electric Corporation (OVEC) supplies power to the Portsmouth plant.

Because electric power is the major portion of the cost of enrichment services, reducing power cost~~s and increa~~sing production efficiency are high priorities. In 1987, DOE re-negotiated its contract with EEInc to provide Paducah an assured, reliable, low-cost base of firm power through 2005. This contract also provides DOE access to the regional power market to allow the purchase of low cost, nonfirm power to meet production requirements. In addition, EEInc has undertaken a project to modify the Paducah area transmission system to enhance its ability to provide DOE with low cost nonfirm power.

In 1990, DOE expects to enter into a new contract with OVEC. This contract extension will allow DOE to continue to purchase low cost, firm power for the Portsmouth plant through 2005. Currently underway at the Paducah plant is the installation of special equipment called freezer-sublimers, which will increase that plant's ability to take greater advantage of available low-cost nonfirm power on short notice. This eventually could save up to $200,000 per day.

In the past, DOE has met budgetary constraints on the purchase of power in several ways. One was to enrich less uranium than customers required and make up the difference from its inventory of enriched uranium. Another was to overfeed the gaseous diffusion cascades with natural uranium from inventory to reduce the amount of electric power needed. These had the additional benefit of reducing inventory carrying costs. In FY 1990, DOE's enriched uranium inventory will be about 4.9 million SWU, which represents the minimum inventory level needed to manage day-to-day operations and assure timely delivery to customers. Since this remaining enriched uranium inventory can no longer be used to reduce production requirements and associated costs for power purchases, the FY 1990 budget request reflects the cost of enriching all the uranium needed to cover expected sales. This translates into a cost of $631 million to produce about 12.2 million SWU using 3,247 megawatt-years compared to $285 million for 6.37 million SWU using 1,656 megawatt-years in FY 1989. This large increase in production will require DOE to purchase all the firm power under contract with EEInc and OVEC and to purchase large amounts of nonfirm power. Of the 3,247 megawatt-years planned for purchase, 662, or 20 percent, will be nonfirm power. While nonfirm power has been used since 1984, this is the first time a significant fraction of the annual production will be based on the purchase of nonfirm power.

Another major power cost is the payment to the Tennessee Valley Authority (TVA) for power not used or "demand charges" under the December 1987 DOE-TVA agreement. Under this agreement, TVA demand charges in FY 1990 are

$311 million. From FY 1991 through FY 1994 the annual payments will be $160 million. No further payments or obligations exist after 1994.

URANIUM MINERS' LAWSUIT

A major uncertainty that had clouded the future of the Uranium Enrichment Enterprise was lifted on February 2, 1989, as a result of the decision by domestic uranium miners to withdraw without prejudice their 4 year old suit against DOE. The miners had sought restrictions on the enrichment of foreign uranium in an attempt to restore viability to the domestic uranium industry. The case had been remanded back to the U.S. District Court for Colorado after the U.S. Supreme Court held that nonviability alone does not require DOE to impose restrictions.

U.S.-CANADA FREE TRADE AGREEMENT

Continued access to competitive uranium markets by domestic customers was further assured with the bilateral approval of the Free Trade Agreement (FTA) between the United States and Canada. In 1987, about 90 percent of the foreign uranium supplied to DOE for enrichment by domestic customers came from Canada. Canadian uranium will now be exempt from the provision in Section 161(v) of the Atomic Energy Act of 1954, which allows DOE to place restrictions on the enrichment of foreign uranium for use in domestic power reactors. Reciprocally, Canada has dropped its upgrading policy, under which conversion of natural uranium to uranium hexaflouride (UF6) was required before export. Under the Free Trade Agreement, U.S. utilities would be free to buy Canadian uranium and to have it converted in the United States without the potential of restrictive trade conditions from either country.

U.S.-JAPAN NUCLEAR AGREEMENT

During the past year the United States and Japan signed a new, 30-year agreement for nuclear cooperation. Twenty years ago, Japan had only one commercial nuclear reactor. Today it has 34 reactors and another 20 on order or under construction. The dependable, secure and economical supply of U.S. nuclear materials and enrichment services has played an important role in Japan's energy security that is in both countries' interest. Total foreign sales of uranium enrichment services by DOE contributes about a half billion dollars to improving the U.S. balance of trade.

ENVIRONMENTAL RESTORATION

The FY 1990 budget request includes funds for important and growing environmental restoration activities at the two operating GDPs and at the Oak Ridge GDP, which has not operated since 1985. The Oak Ridge plant is already in the first phase of decontamination and decommissioning (D&D; clean-up) which consists of removing hazardous materials and surface radioactive contamination to create a "safe storage" condition. This action reflects DOE's strong commitment to protect the public and the environment from any potential environmental hazards resulting from uranium enrichment activities. DOE has also proposed in its FY 1990 budget to the Congress a special D&D fund to ensure funds are available 15-20 years from now when this critical work needs to begin.

The cost of environmental clean-up and corrective actions at all three GDP sites is expected to total approximately $500 million through 1995. These actions include the closeout and cleanup of the gas centrifuge facilities at the Oak Ridge and Portsmouth sites, increased on-site and off-site-groundwater monitoring and decontamination activities, as well as ongoing maintenance of operating facilities.

Compliance agreements have been completed for environmental clean-up work at both the Paducah, Kentucky, and Portsmouth, Ohio, GDP sites with the respective state authorities. These agreements establish the scope and schedule for actions needed to correct environmental problems associated with past operations. Approval by state regulatory authorities provides the framework for proceeding with specific remedial action programs.

ATOMIC VAPOR LASER ISOTOPE SEPARATION (AVLIS)

DOE is conducting research and development on advanced enrichment technologies in support of its commitment to retain leadership in the enrichment industry. The Atomic Vapor Laser Isotope Separation (AVLIS) process is the world's most advanced enrichment technology and the U.S. enjoys a commanding lead in its development. If the potential cost and technical benefits expected from this technology are ultimately achieved, then AVLIS is expected to ensure the long-term price competitiveness of the United States in the enrichment marketplace. Two steps remain to bring AVLIS into commercial production: full-scale demonstration of the technology and construction of the first AVLIS production facility.

The FY 1990 budget request has been increased in order to ensure the full-scale demonstration of the technology by the end of CY 1991. This demonstration program has been designed to determine the technical and economic value of the AVLIS technology and to help ensure that transition to a commercial plant can be timely and successful.

Actions that will be taken in FY 1990 will also focus on the industrial integration of AVLIS by refining performance projections as well as capital and operating cost projections. Activities will include the completion of a preconceptual design for a potential production plant, development of initial regulatory plans, and the generation of a detailed environmental analysis.

Support of AVLIS technology development is necessary now, if it is to be ready when the nation requires it. A decision concerning the commercial use of AVLIS would be better made by a Government Corporation with a clear mission and a strong business sense. This is another reason why it is important to proceed expeditiously with the legislative reforms we are seeking.

DISCUSSION

Mrs. Lloyd. Thank you very much, Mr. Sewell. Certainly, this subcommittee will be looking at the corporation. I, especially, will be holding further hearings in addition to our budget hearings.

Does DOE expect to fully fund the AVLIS production facility with current year revenues? Or, do you plan to ask for additional funding?

Mr. Sewell. The first step we believe that needs to be taken with respect to the AVLIS program is to complete the R&D; that is, to demonstrate the technology. And, we are fully committed to demonstrate that technology. And, our budget reflects that commitment.

We also believe that steps need to be taken now to ensure the timely and effective transition to the commercial marketplace. That involves industrial integration, as I mentioned earlier.

Funds necessary to deploy AVLIS can come from a number of avenues. It can come from existing revenues that are generated on an annual basis. It can come from borrowing of money to capitalize the plant in the context of a Government corporation.

The alternatives available with respect to deploying an AVLIS plant are numerous. And, we are in the process of evaluating which technique, which alternative, is most desirable. We are not in a position today, with respect to identifying exactly how the AVLIS plant deployment can be funded, will be funded, but we believe that that is a necessary element in assuring the future competitiveness of the enrichment enterprise.

Mrs. Lloyd. And, you are saying it can be done with present revenues?

Mr. Sewell. Within our present revenue stream, it is potentially possible———

Mrs. Lloyd. As called for in the 1990 budget?

Mr. Sewell. Correct.

Mrs. Lloyd. But, don't you think it's time right now to select a contractor for the AVLIS technology deployment?

Mr. Sewell. We currently have under contract both Lawrence Livermore and Martin Marietta with respect to our AVLIS program.

Mrs. Lloyd. What is your timing to select the contractor?

Mr. Sewell. We plan to select a contractor in order to integrate industrial experience into our AVLIS program this year.

Mrs. Lloyd. That's part of the integration process?

Mr. Sewell. That's correct.

Mrs. Lloyd. Well, when were you going to do this?

Mr. Sewell. Now.

Mrs. Lloyd. Right now?

Mr. Sewell. Now, not today. We believe that is an important step, and that's one that we are carefully evaluating. And, we are taking steps necessary to make that decision today, tomorrow, within the next several weeks.

We believe, I think, as you do, that it is important to take this next step. And, we are prepared to do so.

Mrs. Lloyd. Well, in so many of our programs in the past 8 years we've got right to the jumping off stage. And, I'm hoping that this administration will be an administration with decisive action so that we can go forward, that we can break ground, that we can make the kind of firm commitments that we need to make as a great nation.

Mr. SEWELL. We share that hope and desire.

Mrs. LLOYD. I want to ask you something. Can Martin Marietta Energy Systems be designated as a contract for AVLIS under the umbrella agreement between DOE and Martin Marietta Energy Systems?

Mr. SEWELL. Yes, it can under the existing arrangement we have with Martin Marietta as part of the management and operating contract for our enrichment program.

Mrs. LLOYD. What is the earliest date that DOE could select a site for the AVLIS technology?

Mr. SEWELL. We believe that a preferred site selection can be made as early as 1990. A final site selection could be made no sooner than mid-1992.

In terms of making a preferred site selection, we would have to do a number of steps.

Mrs. LLOYD. Why does it have to be this long away? Why can't it be done this year or next year?

Mr. SEWELL. There are a number of things that we think need to be completed prior to——

Mrs. LLOYD. And, what needs to be done?

Mr. SEWELL [continuing]. Making a preferred site selection. One is a conceptual design study. The second is, we need to develop site selection criteria, and finally we would like to carefully evaluate environmental data at prospective sites.

Each of those areas and activities is very important in terms of making that decision.

Mrs. LLOYD. What areas are you looking at?

Mr. SEWELL. All three.

Mrs. LLOYD. What areas of the——

Mr. SEWELL. Conceptual design, site selection criteria, and what environmental issues and concerns need to be addressed.

What are the criteria with respect to the environment for—

Mrs. LLOYD. The site?

Mr. SEWELL [continuing]. A particular site——

Mrs. LLOYD. Yes.

Mr. SEWELL [continuing]. In deploying AVLIS?

Mrs. LLOYD. What has been done this past year to expedite the demonstration of AVLIS technology? It seems to me we are really dragging our feet.

Mr. SEWELL. We were not pleased with the progress of the AVLIS program.

Mrs. LLOYD. I'm sure you weren't.

Mr. SEWELL. And, we were as frustrated, I believe, as you with respect to the timeliness and the market potential that AVLIS had and whether we were taking advantage of it. Therefore, we directed both Lawrence Livermore and Martin Marietta to reevaluate the AVLIS demonstration program with the objective of completing demonstration faster and at a lower cost.

Then after extensive review, Lawrence Livermore and Martin Marietta have refocused their efforts and activities and designed a demonstration program in order to complete demonstration by the end of calendar year 1991 at a cost of about $450 million.

This represents a completion of the program from six to 12 months earlier than we had originally anticipated, at a savings of about $150 million.

Mrs. LLOYD. Well, am I not correct that in concluding without AVLIS, DOE will price itself out of the enrichment market in the mid-1990s? And, if this is so, why is it not imperative to stop the demonstration process and complete whatever demonstrations are required and get into the first phase of production facility?

Mr. SEWELL. There are scenarios and there are some real scenarios with respect to the future market, the future cost of enrichment and upper cost pressures on our existing facilities. Within those scenarios, AVLIS is a highly attractive alternative with respect to providing enrichment at a lower cost and providing a greater return.

It is for those reasons that we believe it is important to complete the demonstration of the AVLIS technology and take the steps necessary to ensure that we can deploy when market conditions so warrant and the return on investment is sufficient.

Mrs. LLOYD. Well, I do appreciate your concern. But, I think you also understand our frustration that we are not making the progress that we should.

And, I would hope that during the year that we can work to a little speedier pace.

Mr. Morrison.

Mr. MORRISON. Thank you, Madam Chairman. Do people ever call you Sewell (pronunciation) by chance?

Mr. SEWELL. Yes, they do.

Mr. MORRISON. I know they just couldn't avoid that happening.

Mr. SEWELL. Or worse even.

Mr. MORRISON. Or worse? OK. I'm always interested in the competitive picture of how are we doing in contrast with our foreign competitors.

Perhaps the fact that you have anticipated sales that are greater than we had reviewed before, in that case you are doing rather well.

Mr. SEWELL. This year, we are doing very well with respect to getting higher sales than we had originally anticipated.

What we have faced, quite frankly, is a situation where we once had a monopoly in the world marketplace, a 100 percent market share. That decreased to about 43 percent.

We took steps in order to make this program, this enterprise, more competitive. Today, our market share is about 50 percent. Commitments we have under contract represent a situation in which our market share is still less than 45 percent.

The important thing to note is that there is heavy competition. There is very strong, active competition from the European suppliers, from alternative sources, that jeopardize our ability to optimize our market share and, therefore, return those amounts back to the taxpayer that represent a reasonable return on investment.

Mr. MORRISON. As I recall, a year ago we were sort of hoping that some U.S. generators would commit. What happened?

Mr. **Sewell**. A year ago, our customers made a decision with respect to renewal of a contract commitment for 70 percent in the year 1996, 1997, 1998. Approximately 90 percent of those people recommitted. That was 90 percent of 70 percent.

So, the market that we were able to sustain represented 63 percent of the total potential that we currently serve. That does not count those customers, other customers, that we do not serve that also represent sales opportunities.

The renewal last year was, in our minds, a success. However, it represented also a warning, a warning that we need to continue to be competitive, we need to continue to take steps to reduce our costs and to meet our customer needs in order to ensure that our market volume is sufficient to provide those returns that are necessary to maximize our future health and stability.

Mr. **Morrison**. OK. I notice in the budget request for the first time we have a SWU tax added to the operation of two of our nuclear reactors that are important to this subcommittee, both FFTF and EBR-2, and we end up with those numbers if they hold true adding significantly to the operating cost of these facilities.

What—is this an accounting process? Or, what is going to happen in the future? Is that intended to remain? It's sort of taking money out of one pocket and putting it into another.

Mr. **Sewell**. I must apologize. I missed the point. I'm not sure I understand the question.

Mr. **Morrison**. Is this going to be a continuing—is this advocated as a continuing process?

Mr. **Sewell**. In terms of tax on nuclear facilities?

Mr. **Morrison**. Tax on the fuels that you provide for our two research reactors?

Mr. **Sewell**. We provide fuel to our research reactors from the enrichment facilities at Portsmouth, Ohio.

Mr. **Morrison**. OK.

Mr. **Sewell**. And——

Mr. **Morrison**. I have it listed here as a tax, which perhaps it is not.

Mr. **Sewell**. I'm sorry. We provide enriched uranium for our research reactors, both domestic and foreign. And, we provide enriched uranium at prices that recover our cost.

Those—we do not believe those are taxes. Those just represent the cost of operation.

Mr. **Morrison**. OK. That part is understandable. It appeared to me this was a special assessment.

Just a quick question about the Canadian Free-Trade Agreement and its potential implications for our industry.

Mr. **Sewell**. The passage and the ratification of the Canadian Free-Trade Agreement provides a market environment in which free and fair trade can prosper. And, we, as an enrichment enterprise, are prepared to operate in that environment and we think that we can effectively operate by taking a number of steps that we have outlined.

There are—in terms of other entities, including the uranium industry, we think that there are some positive steps that are being taken and will be taken in order that they can also effectively operate.

We think that a free market, one with competition, is going to benefit everyone in the long run.

Mr. **MORRISON**. Including the mining end of uranium?

Mr. **SEWELL**. We believe that the uranium mining industry can effectively operate. And, there are a number of mining firms in the United States now that are effectively competing in the world market.

Mr. **MORRISON**. Thank you very much.

Mrs. **LLOYD**. Thank you, Mr. Morrison. Mr. Wolpe.

Mr. **WOLPE**. Thank you, Madam Chairman. I want to go back to a couple of questions I asked in my opening statement. They may seem very basic and they are, no doubt, a reflection of my ignorance more than, say relevant to what we are about right now. But, it's important at least for me to understand the origins of how we got from Point A to Point B.

Was there or was there not a full cost recovery requirement in the Atomic Energy Act as it related to the uranium enrichment program?

Mr. **SEWELL**. There is a requirement to recover appropriate costs.

Mr. **WOLPE**. All costs.

Mr. **SEWELL**. Appropriate.

Mr. **WOLPE**. All appropriate costs.

Mr. **SEWELL**. Appropriate.

Mr. **WOLPE**. Well, I mean, only some appropriate costs or all appropriate costs?

Mr. **SEWELL**. All appropriate costs, yes.

Mr. **WOLPE**. Those costs have been put at somewhere in the neighborhood of $10 billion; have they not?

Mr. **SEWELL**. No.

Mr. **WOLPE**. What have they been put at?

Mr. **SEWELL**. I think you are referring to the investment, the investment into this enrichment enterprise over time. And, there has been—today, we estimate that that investment is about $3 billion.

The question that needs to be addressed is how to best recover the investment into the uranium enrichment business. We believe the answer to that question is to build and sustain an enrichment enterprise that is financially healthy, one that has a market base such that you can generate revenues to return that investment.

Mr. **WOLPE**. Without getting into an analysis of the current economic status of the industry, I'm just simply trying to understand the law.

Section 161(v) of the Atomic Energy Act, my understanding of that was DOE was required to recover the full cost of the enrichment program from its customers, that the central concept embodied in that section was that nuclear fuel costs should not, in fact, be subsidized by the taxpayer, and that DOE's pricing policy was required to reflect the operating and the capital expenditures as well as imputed interest.

Now, are you saying that is not an accurate reading of that law?

Mr. **SEWELL**. I believe you just adequately read it.

Mr. **WOLPE**. And, so you do accept that as the law?

Mr. **SEWELL**. Yes, sir.

Mr. **WOLPE**. But, DOE—but, you are saying you take all the capital and operating expenditures as well as imputed interest that the total value of all that is in the $3 billion range rather than close to $10 billion?

Mr. SEWELL. That's correct.

Mr. WOLPE. Well, I would like to--there is obviously some substantial debate on that point.

Mr. SEWELL. I understand that very clearly.

Mr. WOLPE. And, my understanding is that what DOE has done is essentially to use the rulemaking process to reinterpret the law in such a way as to write off a very substantial part of the investment that people, a lot of folks, thought at least was implied in the notion of full cost recovery.

And, I guess, Madam Chairman, at some point I wonder if it might be appropriate for this committee to ask the GAO for its opinion as to the DOE authority to define the content of that section in the way in which it has?

Mrs. LLOYD. GAO has issued a number of reports on this subject. And, we will be happy to provide them for you.

Mr. WOLPE. I would be interested in seeing those reports, particularly as it relates to specifically the write-off from allegedly the 10 billion dollar figure down to the three——

Mrs. LLOYD. We will be happy to supply those to you.

Mr. WOLPE. Thank you very much. What is the current book value of the assets of the Federal/Civilian Uranium Enrichment Program currently, Mr. Sewell?

Mr. SEWELL. It's about $3 billion.

Mr. WOLPE. Does this include any of the federal uranium stockpile? And, if so, how many pounds of uranium and at what value?

Mr. SEWELL. No, it does not include any.

Mr. WOLPE. How much of the book value of the Civilian Uranium Enrichment Program does the DOE propose ultimately to recoup for the American taxpayer and when?

Mr. SEWELL. We propose to recover it all.

Mr. WOLPE. Within what timeframe?

Mr. SEWELL. Within a reasonable time period. We have generally in the past looked at various time periods for recovery of the cost of enrichment. And, that has been in the past about 10 years.

Mr. WOLPE. And, so you are proposing the recovery of the book value as well as the unrecovered—apart from the unrecovered cost question, the book value is what you intend to recover?

Mr. SEWELL. Yes.

Mr. WOLPE. Could you also—when will the three gaseous diffusion plants likely be obsolete?

Mr. SEWELL. We currently estimate that—of course, one is shut down today. We currently estimate that the remaining two, at Portsmouth, OH, and Paducah, KY, will be operational until about the year 2005.

Mr. WOLPE. And, when does the DOE expect to have new technology on line providing for U.S. enrichment needs?

Mr. SEWELL. The timing for new technology will be dependent upon the successful completion of the AVLIS technology program and also dependent upon marketplace needs; that is, the time period in which we can—when introduction into the marketplace is most desirable.

Potentially and on a most highly optimistic or on the most, I guess, highly needed pace, we can be in a position to have new technology in place in the mid-1990's.

Mr. **Wolpe**. Mid-1990's?

Mr. **Sewell**. Yes.

Mr. **Wolpe**. Do you expect to see private integration plants operating in the United States? And, if so, in what capacities?

Mr. **Sewell**. That depends on Congress' reaction and embracement of a legislative initiative to restructure the uranium enrichment enterprise.

Mr. **Wolpe**. Assuming a positive response, you——

Mr. **Sewell**. Assuming a positive response, we believe that the potential exists to have private entities operating a uranium enrichment business.

Mr. **Wolpe**. How much will it cost to decommission and clean up each of the three gaseous diffusion plants to meet the applicable environmental requirements or those that are likely to be applicable?

Mr. **Sewell**. The total cost to clean up those plants, that is to D&D those plants, is estimated from $1 billion to $3 billion for all three plants. The reason that range is so wide will depend upon whether or not this D&D includes putting those facilities in a safe storage condition and finding alternative uses for them in which case the D&D liability or cost will be $1 billion versus a situation in which those sites will have to be green fielded; that is, the buildings torn down and grass basically planted over the ground.

The estimate of that type of cost or that type of scenario would be $3 billion.

Mr. **Wolpe**. And, how much of that sum would you plan to recover from your civilian enrichment customers in the fiscal years that go from now through the year 2005?

Mr. **Sewell**. We expect and plan to recover about 50 percent of those costs from our commercial customers.

Mr. **Wolpe**. Whether it was $1 billion or $3 billion?

Mr. **Sewell**. That's correct. And, we have——

Mr. **Wolpe**. Fifty percent is the goal independent of the sum; is that correct?

Mr. **Sewell**. Except for one circumstance. That is, we are planning on establishing a D&D fund and collecting moneys on a schedule that would generate $1.5 billion by the year 2005, the time period in which we expect that the full cost or these D&D liabilities will face the Department.

Therefore, we are planning on the worst case and putting into place the mechanism to collect the funds necessary to discharge that responsibility.

Mr. **Wolpe**. How much has DOE recovered up to this point? Or, has it recovered anything from its customers to pay for such decommissioning?

Mr. **Sewell**. What we are doing today is that we have collected nothing with respect to D&D of Portsmouth, OH and Paducah, KY diffusion plants. We have collected nothing today with respect to the second phase of D&D at the Oak Ridge gaseous diffusion plant.

We are collecting revenues on an annual basis today and using those revenues to offset ongoing costs to perform the first phase of D&D at the one plant that is shut down.

So, the short answer is, we are collecting moneys today in order to offset costs to put the Oak Ridge Gaseous Diffusion plant in a safe storage condition; that is, to decontaminate the equipment and facilities at that site.

Mr. **Wolpe**. I have just two last questions. Is DOE currently distributing uranium from the American stockpile to civilian uranium enrichment customers? And, if so, at what price is the uranium carried on DOE's books and how much has DOE distributed or plans to distribute in the coming fiscal years?

Mr. **Sewell**. Excuse me. I'm not sure I heard your total question.

Mr. **Wolpe**. Is DOE currently distributing uranium from the American stockpile to civilian uranium enrichment customers? And, if so, at what price is that uranium carried on DOE's books and how much has been distributed or does DOE plan to distribute in the coming fiscal years?

Mr. **Sewell**. We are not selling that uranium inventory to any commercial customers. The value of that uranium carried on our books is about $9 a pound.

We are using that uranium inventory to offset cost of power and, therefore, minimize our cost to production so that we can keep our prices, our cost down and, therefore, our prices within a competitive range to sustain our market base.

Mr. **Wolpe**. OK. My last question is just simply to clarify whether DOE's current position is the same as was expressed by Secretary Herrington in 1987 when he indicated that the domestic uranium industry was non-viable and that the DOE supported legislation such as the bail-out bills, S–2097, for example, of the last Congress in which the United States would distribute uranium at $9 per pound and use the proceeds to purchase uranium from domestic mills at $25 or more per pound; in addition, DOE proposed to collect over $1 billion from utilities and taxpayers to pay the private uranium companies to clean up private uranium mill tailings while not providing any assured means of cleaning up the three gaseous diffusion plants.

Is that still basically the DOE position? Or, do I mischaracterize it?

Mr. **Sewell**. That was the position I think that adequately described that the administration took last year with respect to comprehensive legislation.

Today, the administration supports legislation to restructure the uranium enrichment enterprise—uranium enrichment. The administration also supports a strong, vital, domestic uranium industry. And, we feel that is important to this Nation's best interest.

And, any legislative proposal or offer to or generated by Congress to assist the domestic uranium industry will be carefully evaluated by the administration.

Today, we have nothing to offer you in terms of our own. What we are saying is that we support the concept of a strong, vital, domestic uranium industry and we are in a position to engage in dialogue to preserve that principle.

Mr. **Wolpe**. Thank you very much. Thank you, Madam Chairman.

Mrs. **Lloyd**. Thank you, Mr. Wolpe.

Mr. Fawell.

Mr. **Fawell**. Thank you, Madam Chairman.

Mr. Sewell, you articulate your position very well, and I wish you well in the plans that you have.

You have indicated that during this fiscal year, apparently, 153 million more in sales has come in that were not anticipated.

Why the increase, in your opinion? What was the causative factor or factors?

Mr. **Sewell**. One of the primary reasons for the increase is the successful operation of nuclear power plants and the high capacity factor of nuclear reactors in the United States today. They are operating longer and at higher capacity factors than we had anticipated.

We had projected customers to have a need for enriched uranium at levels assuming lower capacity factors. In addition to that, a number of customers are increasing their product assay. They are increasing the enrichment; that is, the value, the uranium content of their fuel to be loaded in the reactors, and that requires more SWU; that is, more enrichment.

Those are two of the factors, at least, that have contributed to the increased sales volume.

Mr. **Fawell**. So it isn't necessarily that there has been any great increase in productivity or techniques or efficiency necessarily?

Mr. **Sewell**. Actually, there has been. There has been an increase in productivity or efficiency of the operation of those nuclear power plants.

Mr. **Fawell**. All right.

Mr. **Sewell**. That is very commendable, and that provides, I think, a greater degree of confidence for energy security in the United States, with the successful and high reliability of our nuclear power plants.

Mr. **Fawell**. Now, the other question, Madam Chairman, that I have—and I know last year we discussed this and perhaps it has been discussed as fully as it ought to, but I don't recall all the points—when we talk about this Government-owned corporation, we understandably hope that all the attributes of a privately owned free enterprise, competitive corporation would be attributed to this particular Government-owned.

So it is still a public entity that is involved, and I guess it would be easy for one to say, well, it still is government doing it, and a rose by any other name smells just the same and is the same.

But is there another analogous corporate—Government-owned corporation which you could cite, for instance, which would perhaps give this one Member of Congress a little hope that indeed by setting up a so-called corporate characteristic, although it isn't truly a corporation in the free enterprise mode, that where success was had?

Mr. **Sewell**. We think that Conrail represents a fairly good example with respect to the transition of Government assets of a Government-owned entity to first a Government-type of corporation and then sale of stock to the private sector.

The railroad industry at one time was in a significant stage of demise, and these assets and the operations were restructured and they were given characteristics more analogous to a commercial entity, and then after a number of years of successful operation; that is, developing a track record—and that is what we would propose to do with uranium enrichment; that is, establish a Government corporation with stock held by the U.S. Treasury so that the Government still held ownership to this business—give it time to operate and exhibit financially sound, businesslike characteristics. Then you will create a circumstance that will attract investment, that will attract people's interest in buying stock and in getting involved in this program.

Mr. **Fawell**. And you would anticipate the potential then of having a corporation such as this, the stock sold off?

Mr. **Sewell**. Yes, after a successful period of time showing a good track record of business operation and financial strength. Yes.

Mr. **Fawell**. And the Conrail is analogous in all basic points?

Mr. **Sewell**. I believe so.

Mr. **Fawell**. Fine, thank you.

That is all the questions I have.

Mrs. **Lloyd**. Thank you, Mr. Fawell.

Mr. Henry.

Mr. **Henry**. Thank you, Madam Chairman.

What if I just explore a little bit more on the reasons for the loss on the demand side, as it were, in terms of your contract customers and inability to achieve cash recovery of the Government's investment in the uranium enrichment process.

One you cited was increased efficiency in the industry in the way in which it utilizes fuel.

Secondly I presume would be substantially restrained expansion of the industry, and given any number of safety, environmental, and regulatory problems that have developed in the years, which obviously substantially interfered with projections on demand.

I am wondering if, thirdly, you might touch on some of the trade variables that might be here. In other words, what is the going rate—for example, when you are charging today, when you are selling your enriched fuel, what does it cost in the market here as opposed to the European or the Soviet export of comparably enriched fuel?

Mr. **Sewell**. That is a very difficult question to answer. One of the problems that we have as a Government program is that we live in a fishbowl and our competitors do not. Our prices, our costs, our operation, everything we do is subject to circumspection.

That is not true with respect to the operation, the prices, the costs, the competitive practices and the dealings that our European competitors and people who sell material that has been enriched in the Soviet Union enjoy. They enjoy a cloak. They enjoy a cloak of business confidentiality that prevents us from being able to directly compare our situation with theirs.

However, we believe that our cost of operation is highly competitive with respect to European suppliers, and our European competitors offer prices to equity partners; that is, to customers that have an equity share in their plants. They offer enrichment to them at prices that are higher than what we offer to our customers in the United States and abroad.

However, they have the opportunity to marginally price or to offer enrichment for that capacity over and above what they provide to their equity partners at prices and under conditions that are very favorable and highly competitive with those that we offer.

Mr. **Henry**. Let me just interject here. In other words, you are saying that they are actually selling at cheaper rates to nonequity partners than equity partners?

Mr. **Sewell**. We believe that is the case, yes.

Mr. **Henry**. Which seems contrary to any principle of business organization.

Now, let me ask you another. What are the given rates? I mean, are American users prohibited by law from purchasing their enriched stock from these sources?

Mr. **Sewell**. No, they are not.

Mr. **Henry**. What do their books show in terms of price paid per pound for enriched uranium of comparable quality?

Mr. **Sewell**. I have not had the luxury of examining their books with respect to the prices they pay to our competitors.

Mr. **Henry**. I am just wondering. The reason I am asking—and I am new on the committee. I have got no axes to bear. I am concerned with some of the questions my colleague from Michigan has raised, but I wonder if, particularly given the national significance of energy independence, which I think pertains to all areas of energy, not just oil or coal or whatever our other interests may be—when I was thinking of an analogy, I was thinking not so much of Conrail as agriculture—I am wondering what by nature of export subsidies or direct supports into the industry are not being recovered by the competition, and you really have issues here of a globally competitive nature which also were not envisioned when this program was originally established.

I am concerned about the questions that my colleague from Michigan has raised. He is talking about recovery at a level of maybe 50 percent independent of the sum, and of course he also asked you whether that was also independent of the law, and you do have a law there and the bookkeeping or regulatory definition may not be satisfactory in fully resolving some of the questions the committee would legitimately ask.

But anything you could do by way of establishing a public record in terms of what I would call trade equity in industry I think would be very, very helpful.

We engage in many kind of subsidies; for example, in the agricultural sphere, with which many of us are not happy, but sometimes we feel we have no choice because it is protecting private production in the face of unfair competition.

If you can legitimately establish some of those things, and particularly for—there are several of us who are new in this subcommittee—I think it would—and do not have direct interest in the issue—be very helpful to us, and the issue may very well be whether we are paying as taxpayers or consumers—either way we are going to pay on the issue to resolve it—but might help us resolve in our minds which way we would favor paying for it, as consumers or as taxpayers.

Mr. SEWELL. We understand, and we will be pleased to work with the Congressman in that regard.

Mr. HENRY. So I can anticipate some good hard data on some of this, right?

I mean, I have read—you have given us a full statement in terms of where the competition is, who is marketing, and you will get us some costs in terms of what they are selling it for?

Mr. SEWELL. We would be glad to share our information with you.

Mr. HENRY. Thank you.

Mrs. LLOYD. Thank you very much, Mr. Henry.

I have two or three more questions I would like to ask, Mr. Sewell.

Do you expect to have any difficulty in meeting customer demand this year or next year to inability to pay for more power purchases?

Mr. SEWELL. Potentially, yes, especially under the circumstance that higher demands are realized, that we are able to produce due to the budget authority limitations established in the budget bill. So potentially, yes.

However, we do not expect any difficulty in meeting deliveries this year because we will be submitting a supplemental budget request to give us additional authority to buy power and therefore meet sales and hopefully optimize our production operations.

We hope Congress will expeditiously consider and approve this request.

Mrs. LLOYD. Do you know how much you could have saved if you could have bought power this year instead of making power purchases next year, and why was this not done?

Mr. SEWELL. If we had had the capability of buying more unfirm power this year, we could have potentially saved from $60 to $100 million in power purchases next year. The primary reason for this is because the cost of power and the cost of production is going to be twice as high next year.

However, we are limited by the budget authority, by our own budget authority, from purchasing more power this year, and therefore we were not able to take full advantage of the opportunity that this afforded.

Mrs. LLOYD. Well, now if you are going to be constrained in your ability to purchase power, why is $29 million proposed to be paid back in the Treasury? Shouldn't these funds be used in the business?

Mr. SEWELL. Well, if enrichment were established as a Government corporation, then we would not have constraints in buying power or we wouldn't be subjected to the potential problems that we just discussed, and this is one of the reasons why we feel a Government corporation is desirable.

The $29 million which you refer to involves a payment, a payment on the interest of a $364 million debt. That is within the context of establishing a government corporation.

Now, this $29 million payment would occur if a corporation is established.

Mrs. LLOYD. Going to another subject, does DOE foresee a need for any legislation on the domestic uranium supply industry?

Mr. **Sewell**. Well, as I mentioned before, we do support a vital and strong domestic uranium industry. It is important for the United States, and any legislative proposal that is offered or considered by Congress, the administration would carefully evaluate.

Mrs. **Lloyd**. Will you be submitting legislation on enrichment?

Mr. **Sewell**. We will be submitting legislation to create and establish a Government corporation for uranium enrichment. We will not at this time be submitting legislation beyond that which would address the domestic uranium industry.

Mrs. **Lloyd**. Would you support legislation to ban the importation of Soviet origin enriched uranium?

Mr. **Sewell**. Any such importation ban would obviously benefit both the domestic uranium industry and the U.S. enrichment enterprise. The reason I mention both is because material that was originally enriched in the Soviet Union has been offered in the United States and sold in the United States. That displaces potential sales that could have been made by domestic uranium producers and by us.

So any importation ban would obviously benefit us. However, the administration would have to carefully evaluate any such legislative initiative in light of overall costs in this area.

Mrs. **Lloyd**. Well, would you say that the Soviet Union fairly competes for enrichment sales?

Mr. **Sewell**. It is our understanding that enriched uranium that originated from the Soviet Union is being offered at prices nearly 50 percent below those prices that are available from DOE and from other major enrichment suppliers, those in Europe.

Now, these transactions have involved at times uranium that could have displaced sales from domestic uranium producers. At the prices being offered in the market today, it is difficult to conclude that these prices represent the cost of production that are typically associated with enrichment facilities.

Since the U.S.S.R. has a centrally controlled economy and is not a signatory or member of GATT, the means to definitively assess whether they are fairly competing or not are somewhat limited.

Mrs. **Lloyd**. I don't want to delay the hearings any more, but I will be submitting some questions in writing, Mr. Sewell, and I would like for you to answer for the record of the hearing. But I don't want to take more than my fair share of time. But I would like for you to provide the committee with whatever information that you have on United States utilities, United States utilities' purchase of Soviet-enriched uranium, if you will.

And I do thank you for being here this afternoon, and you are an excellent witness.

Mr. **Sewell**. Thank you.

Mrs. **Lloyd**. Thank you very much.

Our next two witnesses form a panel of unparalleled expertise on the laser enrichment process. The first member of the panel is Dr. James I. Davis, Associate Director for Lasers at the Lawrence Livermore National Laboratory. Dr. Davis has been recently promoted to this spot, and we welcome you before the committee in this new capacity.

The second member of the panel is Dr. J. Robert Merriman, the Vice President for Enrichment at the Oak Ridge National Laboratory. He is an old friend of mine. He is also a constituent. His advice I have come to rely upon over the years, and certainly I am happy to see you with your expertise before this subcommittee again, Dr. Merriman.

Gentlemen, both of your written statements will be made a part of the record. We ask you to summarize them for the committee at this point.

Dr. Davis, would you please begin?

PANEL 1

STATEMENT OF DR. JAMES I. DAVIS, ASSOCIATE DIRECTOR FOR LASERS, LAWRENCE LIVERMORE NATIONAL LABORATORY; ACCOMPANIED BY DR. MARY SPAETH

Dr. DAVIS. Madam Chairman, members of the committee, members of the staff, I appreciate the opportunity to testify today, with special emphasis on the AVLIS program.

Madam Chairman, with your permission I would like to introduce Ms. Mary Spaeth, who is my Deputy for the——

Mrs. LLOYD. Would you have her come to the table, please, Dr. Davis?

Dr. DAVIS. Yes, ma'am, thank you very much. I would appreciate that.

Mrs. LLOYD. We welcome you as well.

Dr. SPAETH. Thank you.

Dr. DAVIS. I would like to focus my comments on the subject of deployment of an AVLIS enrichment plant in the U.S. The policy matters affected by AVLIS deployment include energy security, technological competitiveness, balance of trade, safeguards and nonproliferation, supply of special nuclear materials, and U.S. employment.

AVLIS deployment will further these U.S. policy goals by providing a lower cost uranium enrichment capability, thereby giving us higher leverage in the world marketplace.

The international market, as you have heard earlier, is highly competitive, as shown by our steady loss of market share, now estimated to be between 40 and 45 percent, down from 100 percent in 1974.

Uncommitted demand for about 10 million SWU in the mid to late 1990's is up for grabs, and price and product assurance will be major factors in the competition for this market.

Our current enrichment technology, gaseous diffusion, is an old technology facing cost growth due to a number of factors, including increased electricity and maintenance cost.

In contrast, the AVLIS process is based on modern lasers, electronics and materials processing technologies. Our ability to continually innovate these technologies and maintain low cost in spite of inflation and schedule delays has been critical and will continue to be so during and after deployment.

A recently completed AVLIS plant design projects enrichment costs in the range of $25 to $50 per SWU, depending on plant capacity and details of the interfaces with the fuel cycle.

There are three major elements in the AVLIS deployment program which must be achieved in parallel—completion of production prototypical demonstrations of engineered equipment, number one; number two, formation of an appropriate deployment organization consistent with the timing of preferred site selection and NEPA requirements; number three, formation of an appropriate management structure capable of proceeding toward early deployment.

I will return to these at the conclusion of my testimony.

If we can successfully manage the deployment activities, I believe we can beat the competition and support the policy goals outlined earlier. We are currently four to five years ahead of the competition and can sustain this lead with a concerted effort.

The foreign competition primarily includes the following countries:

First, France, primarily represented by Eurodif, a French-led European consortium, with approximately 11 million SWU per year of gaseous diffusion capacity, and an AVLIS program with deployment advertised for the late 1990s.

Second, the West Germany/Holland/United Kingdom consortium, often referred to as Urenco, with approximately 2 million SWU per year, with plans for expansion. They are also courting U.S. utilities to establish a U.S. enrichment company utilizing their technology.

In Japan they now have under construction 1.5 million separative work units per year using the centrifuge technology, and they also are aggressively pursuing AVLIS technology.

The USSR, which was mentioned earlier, has historically supplied some 1 to 3 million SWU per year to the Western bloc, and they have unknown excess capacity over Eastern bloc demand. The concern over flag-swapping to penetrate broader markets, including the United States, was mentioned earlier.

We conclude from these analyses, which are more detailed in my written testimony, that the current situation exemplifies the maxim that he who hesitates has lost. We need to move aggressively to counter this competition, and the AVLIS technology provides the opportunity for such a move.

If we play the game of international competition, we should play it to win, and we believe our lead in AVLIS technology offers us a winning hand if we bet our money and organizations in the next 6 to 8 years.

Let me review now the status and progress in our AVLIS technology.

I believe this committee is familiar with the three major subsystems of AVLIS which are extensively illustrated in my written testimony. Let me summarize.

The first subsystem is lasers. That consists of copper vapor and dye lasers and the associated optics as required to select out Uranium 235 from a uranium metal vapor stream.

The second subsystem is called the separators, which includes uranium vaporizers and collectors as required to vaporize feed and handle product and tails.

The third major subsystem is the so-called uranium processing or the chemical processing as required to prepare metal feed and product acceptable to the fuel fabricators.

Some key accomplishments in each of these technologies are as follows:

In the case of lasers, the copper vapor laser's costs have been reduced to approximately 40 percent in the most recent builds.

Also, more than 800,000 hours of copper vapor laser operating time has been achieved in around the clock operations to date.

The total power out of these lasers has doubled to over 6000 watts and the repetition rate has tripled this past year.

In the case of the separators, my discussion of our recent significant progress in separators is constrained somewhat due to classification, but I can summarize our results by saying that design requirements have led to simpler, lower cost units.

In the case of uranium processing, the continued effort on a metal base technology for preparation of feed and product has proceeded with reduced cost. Initial small-scale demonstrations of metal production and product purification have been successful.

In addition to these individual technology developments, we have continued integrated enrichment demonstrations, building on previous years' results. We carried out a test series last year that once again validated our enrichment models, this time with critical elements of full-scale separators that are the basis for our low cost SWU projections.

Based on our continuing demonstration program and plant design studies for an expandable 3 to 10 million SWU per year plant, we continue to be bullish on AVLIS. The high uranium throughput per unit floor space, which is about 10 percent of a diffusion plant, and the intrinsic modularity, 3 million SWU per year increments, make low cost enrichment possible while meeting design criteria associated with general licensing and NEPA requirements.

Finally, I would like to summarize our proposed plant deployment plan to achieve initial production in the 1996 time frame. The success of this plan depends on the following actions:

Number one, designation of a preferred deployment site in 1990 to allow initiation of the NEPA process.

Number two, authorization of an fiscal year 1991 plant design line item.

Number three, completion of the ongoing demonstrations of production prototypical equipment by the 1991–92 time frame.

Number four, formation of a plant deployment organization in 1990 that utilizes the key personnel of the current team and augments them with key project and business management personnel.

Point number five is establishment of a management structure in 1990 that is exclusively focused on AVLIS deployment and not encumbered with other missions.

Now, I would like to just illustrate what might be one interpretation one might apply to those last two points by way of an example, and this is an example of how such an AVLIS plant deployment organization could be incorporated within the current DOE contractual framework, and this was recently proposed in a letter from Clyde Hopkins, the President of Martin Marietta Energy Systems, to John Nuckolls, the Director of Lawrence Livermore National Laboratory, and I would just like to read the second page, second and final page of that letter, the first page being just a definition of terms. And it is:

My recommendation—and this is Mr. Hopkins talking to Mr. Nuckolls—is that a new corporate entity exclusively dedicated to AVLIS demonstration and deployment be formed within Martin Marietta Corp. I believe that this step can be taken with the contractual responsibilities awarded to Martin Marietta Corp. Following its successful bid in the competitive selection of a new contractor to manage and operate U.S. enrichment facilities in 1984.

My recommendation will include the necessity of constructing a corporate framework that is conducive to attracting key personnel from all relevant organizations, particularly from Lawrence Livermore National Laboratory and Martin Marietta Energy Systems.

I recognize that an essential element of success is the continued contributions of those who have built the facilities and experience base that exists today.

In addition to the technologies and engineering efforts central to meeting our programmatic objectives, the elements of the new corporate entity will include groups responsible for plans and analysis, legal issues, engineering services assurances, personnel and associated functions.

Additionally, and very importantly, there will be a group responsible for interfacing with the community who will finance the plant.

My expectation is that this new corporate entity can be structured appropriately for operation within DOE, in a government corporation, or in the private sector.

Mrs. LLOYD. Dr. Davis, would you enclose the letter from Mr. Hopkins in with your testimony, if you would, please?

Dr. DAVIS. Yes, ma'am, I will.

Mrs. LLOYD. For the record.

The letter mentioned above follows:]

MARTIN MARIETTA

M TIN MARIETTA ENERGY SYSTEMS, INC.

POST OFFICE BOX 2003
OAK RIDGE, TENNESSEE 37831

November 23, 1988

Dr. John Nuckolls
Director
Lawrence Livermore
National Laboratory
P.O. Box 808
Livermore, CA 94550

Dear Dr. Nuckolls:

During the past thirteen years, personnel from Lawrence Livermore National Laboratory and Martin Marietta Energy Systems have been cooperating on the development and engineering of hardware and systems for the AVLIS process.

The concept for serious pursuit of low-cost enrichment via exploitation of the high isotopic selectivity that is possible with the use of high-power lasers was originated at LLNL in the early 1970's. Soon after, personnel from the Oak Ridge site were invited to become partners in this effort by Jim Davis, then the LLNL AVLIS Program Manager.

During the intervening years, staff members from LLNL and MMES have jointly developed the key elements of the hardware and built a strong and experienced scientific and engineering team judged by many to be the best in our country for pursuit of a large-scale, high-technology goal.

Within the past several years, the progress made by this team has been particularly impressive. I have been following this progress closely and agree with the judgment of personnel from both of our organizations that AVLIS is now technologically well positioned for aggressive pursuit of a production-scale facility.

This is a fortunate circumstance for the country because it comes at a time when there are multiple threats facing our current enrichment production capacity.

It is generally acknowledged by our community that successful deployment of an AVLIS production facility will require introduction of a new management approach and a shift in institutional responsibilities. Our organizations have signed several agreements in the past indicating our intent along these lines.

It is now timely to become more definitive regarding the future management of the national AVLIS Program. Subject to the approval of DOE, it is my intent to recommend to the management of Martin Marietta Corporation the establishment of a new corporate entity that will have the responsibility for deployment of the AVLIS production facility. A key feature of my recommendation will be that this organization have responsibility for integrated pursuit of the remaining hardware and systems demonstrations and plant deployment activities. I have selected this approach because it tightly couples activities associated with design and demonstration of the plant prototypic systems to the parallel design and operations planning for the plant itself. An additional benefit is derived in that insight and design criteria that result from evaluation of plant issues—such as those related to regulatory issues, safeguards and other areas of assurance—can be fed back into the design and test of the prototype hardware in a timely manner.

My recommendation is that a new corporate entity, exclusively dedicated to AVLIS demonstration and deployment, be formed within Martin Marietta Corporation. I believe that this step can be taken within the contractual responsibilities awarded to Martin Marietta Corporation following its successful bid in the competitive selection of a new contractor to manage and operate U.S. enrichment facilities in 1984. My recommendation will include the necessity of constructing a corporate framework that is conducive to attracting key personnel from all relevant organizations, particularly from LLNL and MMES. I recognize that an essential element of success is the continued contribution of those who have built the facilities and experience base that exists today.

In addition to the technology and engineering efforts central to meeting our programmatic objectives, the elements of the new corporate entity will include groups responsible for Plans and Analyses, Legal issues, Engineering Services, Assurances, Personnel and associated functions. Additionally and very importantly, there will also be a group responsible for interfacing with the community who will finance the plant.

My expectation is that this new corporate entity can be structured appropriately for operation within DOE, in a Government Corporation, or in the private sector.

LLNL facilities and personnel must continue to play a key role in the AVLIS Program in both hardware demonstration and plant deployment.

- Key component and systems demonstrations and their design iterations will continue to be completed in existing LLNL facilities. These activities are projected to peak in 1991; beyond this time the facilities are expected to support necessary aspects of plant deployment needs.

- Although the core group of senior personnel directing program activities will be Martin Marietta employees, participation of a significant number of LLNL personnel is expected to continue. Funds for use of facilities and services, and for personnel support, will be transferred from the deployment organization to LLNL using existing mechanisms for such transfer.

A new separate entity will allow maximum flexibility for direction of deployment efforts from the perspective of an energetic, entrepreneurial, profit-oriented organization. Transition of program responsibilities would be expected to occur as soon as contractual agreements acceptable to DOE can be settled and the management of the new organization has been selected.

The action that is proposed in this letter is an essential step for maintaining the future competitiveness of the U.S. uranium enrichment enterprise. I look forward to further discussions with you on this topic and to our continued cooperation in successfully deploying AVLIS production into the marketplace.

Sincerely,

Clyde Hopkins
C. C. Hopkins
President
Martin Marietta Energy Systems, Inc.

Dr. DAVIS. The letter continues on with a number of details regarding how this might be structured consistent with the existing DOE framework. I will not read those.

Mrs. LLOYD. We would like to review that later as we have further hearings on the enrichment business.

Dr. DAVIS. Okay.

Thus, I conclude if these technical and administrative actions are accomplished along with appropriate funding, we are confident of meeting our 1996 production goal.

Because of faster than expected progress during the past year, we are revising our budget request downward. The request for the fiscal year 1990 budget is $158 million, which is $10 million above the President's budget, in order to prepare predeployment documentation and design.

However, this should be compared with a total estimate last year of $183 million required in fiscal year 1990.

Also, we are now requesting $186 million for fiscal year 1991, as compared to last year's projection of $193 million for fiscal year 1991.

Please note that in figure 22 of my written testimony there is an error, in that certain numbers did not include the plant activities.

Mrs. LLOYD. If you had more money, could you speed the demonstration process any significant amount of time?

Dr. DAVIS. I think at this point there is very little elasticity in that schedule. The impact of these cost reductions are that we have made improvements in the technology, and also we have tried to reduce as much as we can without incurring added risk the facilitization at Livermore, and that is what has led to these cost reductions.

I don't think there is much elasticity in the schedule at this point.

So the proper reference numbers in figure 22 of my testimony should be the same as those in Dr. Emmett's testimony of last year. There was simply a failure to include the plant activities.

So, finally, we feel that progress has been exceptional in the AVLIS program. Such progress has been made possible by the Committee and the Congress, and for that we are profoundly grateful. We hope to reward this support by achieving a successful deployment of AVLIS technology in the 1990s.

Thank you for the opportunity to appear before you today.

[The prepared statement of Dr. Davis follows:]

AVLIS Uranium Enrichment Program

Statement prepared for
Subcommittee on
Energy Research and Development
House Committee on Science, Space, and Technology

February 1989

University of California
Lawrence Livermore
National Laboratory

AVLIS URANIUM ENRICHMENT PROGRAM

Statement prepared for
Subcommittee on
Energy Research and Development
House Committee on Science, Space, and Technology

by

James I. Davis
Associate Director for Lasers
Lawrence Livermore National Laboratory

February 22, 1989

AVLIS Uranium Enrichment Program

I would like to express my appreciation to this Committee for the opportunity to present a statement on the Atomic Vapor Laser Isotope Separation (AVLIS) Program and its role in the future of the United States Uranium Enrichment Enterprise.

Development activities in the AVLIS Program at Lawrence Livermore National Laboratory (LLNL) began in 1973. Since 1976 there has been a fruitful and cooperative effort between LLNL and the Oak Ridge site contractor, originally Union Carbide Corporation and now Martin Marietta Energy Systems (MMES). The progress and recommendations that I report here today and the plans that I will present result from the joint efforts of our two organizations.

Introduction

The topic for our discussion is the deployment of an AVLIS enrichment plant in the United States. There is an urgency to this discussion that is driven by evolving market, economic, and technological forces (Figure 1).

- The international enrichment market remains highly competitive. Foreign suppliers continue to target and erode the Department of Energy's market share. The long-expected battle for the billion dollar per year "price-sensitive" market of the mid- and late-1990s has begun.
- The gaseous diffusion plants (GDP), our country's enrichment facilities, are faced with multiple economic, environmental, and regulatory pressures that could make them non-competitive within the next decade.
- AVLIS technology is being pursued vigorously in both France and Japan.

The U.S. role in the international market has historically been important to this country for reasons of energy security, technological competitiveness, balance of trade, safeguards and non-proliferation, supply of special nuclear materials, and U.S. employment. In spite of the evolving forces now facing the Enterprise these reasons are still important.

Fortunately, the technological status of our nation's AVLIS Program makes us well positioned to face the competition and meet the needs of the markerplace. Since our meeting of last year we have tested the integrated laser and separator technologies at a scale that leaves no doubt that the deployment sequence for an AVLIS uranium enrichment plant can now begin and be successfully completed. A recently completed AVLIS Plant Design Study projects very attractive enrichment costs in the range of $25 to $50 per SWU. This is the lowest cost enrichment technology known. The AVLIS Program is confident that the status of the technology supports construction and operation of a production facility in time to serve the price-sensitive market. Congressional and Department of Energy actions are needed to meet this target schedule:

- Provide funding to support completion of the integrated engineering demonstration system in FY 91.
- Designate a preferred deployment site to initiate environmental, health and safety documentation activities.
- Support formation of a capable profit-oriented deployment organization.
- Prepare for an FY 91 design-only line item.

Completion of these items during the next year, along with the continuing success in the AVLIS technology program, will help assure that the United States can maintain its role in the international market.

Market Conditions

Until 1974 the United States was the sole supplier of enrichment services to the free world. Since then, foreign enrichment capacity and market share have grown significantly and foreign suppliers continue to market aggressively (Figure 2). By 1987, although the United States was still the single largest free-world supplier, its market share had been reduced to 50%. During 1988, the total international enrichment market increased, but the U. S. market share dropped to a new low of approximately 41%.

For the past several years our testimony has included 20-year projections on the character of the free-world enrichment market. Projections this year (Figure 3) are very similar to those shown previously. Two straightforward conclusions can be reached:

- Market opportunities for the U.S. between now and 1995 are minimal, reaching approximately one million SWU per year.
- Between 1995 and 1997 the price-sensitive market opens to nearly 10 million SWU per year. This represents a business opportunity of approximately $1 billion.

Strategies for current U.S. customers to fill their post-1995 enrichment needs are under active consideration today. Because of the long-term nature of many enrichment contracts, decisions made in the 1990-1992 time frame could determine our market share into the next century. The Department of Energy must provide convincing evidence that the U.S. will remain a competitive, reliable, and long-term enrichment supplier in order to retain domestic and foreign utilities as they make their supplier selection decisions. It is now important to review the U.S. Enrichment Enterprise's position with respect to our competition.

Our Present Capability in the Gaseous Diffusion Plants

The U. S. Enrichment Enterprise relies exclusively on the energy-intensive gaseous diffusion plants at Paducah, Kentucky and Portsmouth, Ohio (Figure 4). These plants were built in the 1950s and have had several major upgrades during the intervening years. Presently the plants are operating in a cost-competitive regime.

A key problem for continued economical enrichment from these plants is the future availability of low-cost electrical power. This low-cost power is threatened by impending acid-rain legislation (recently highlighted by both President Bush and Senate Majority Leader George Mitchell) and the country's decreasing availability of excess electrical generating capacity.

A relatively new issue for the GDPs is increasing pressures on other cost centers; significant budget growth is anticipated for dealing with environmental and safety issues and with more stringent requirements in the area of safeguards and security. A potential exists for an increasing level of maintenance as the facilities age.

The United States GDPs are most likely looking into a future with increased costs.

Foreign Competition

Our competitors (Figure 5) understand the market situation as well as we do and are responding with aggressive marketing, increased capacity, and technology improvements.

Eurodif, the French-led European consortium, is DOE's largest competitor. It is capable of producing 10.8 million SWU per year with expansion to 12 million SWU per year possible. The capital debt on their GDP facility is expected to be reduced to zero in ~1997. Because Eurodif is an important element in the vertical integration of nuclear services offered by France, it is well positioned to market its enrichment services. France has also announced its intent to deploy an AVLIS plant in the late 1990s.

Urenco, the West German-Dutch-United Kingdom consortium, uses the low power consumption gas centrifuge process. Urenco now has a capacity of about two million SWU per year and has plans for European expansion to about five million SWU per year. Urenco is also in serious negotiations with several U.S. companies to construct a gas centrifuge enrichment plant in the United States.

The USSR, through its export company Techsnabexport, has for many years delivered from 1.5 to 3.5 million SWU per year to the free world. At the present time the Soviets are aggressively marketing low-cost enrichment to the European community. Through the efforts of various brokerage firms and flag-swapping, their presence is also being felt in the United States. It is possible that a number of events in the Soviet Union (e.g., a build-up of enrichment capacity in anticipation of increased reliance on nuclear power) have combined to create an increase in the excess Soviet enrichment capacity saleable to the West in exchange for hard currency. This situation is likely to last for some years to come.

Japan, a major DOE customer, is vigorously pursuing its strategic goal of obtaining a domestic enrichment capability. A 1.5 million SWU per year gas centrifuge plant is currently in construction and the Japanese are evaluating two advanced technology options: chemical exchange and AVLIS. Japanese investment in the AVLIS process has grown significantly in the past two years with the participation of the three industrial giants: Hitachi, Mitsubishi Heavy Industry, and Toshiba. Their plans include a significant enrichment demonstration in 1991.

Conclusions from this Analysis

Several key points emerge from an analysis of the market, our competition, and the GDP situation.

- The uranium enrichment market is becoming increasingly competitive, and the nuclear utilities, including those in the U.S. (with pressure from their PUCs), are now seeking contracts on the basis of their competitive merits.
- Foreign competitors are seeking to lower their production costs through technology improvements and capacity expansion. Any rise in the value of the weak U. S. dollar will make it even more difficult for us to compete in the long-term world market without the capability to provide lower cost enrichment services.
- Because the degree of price cutting is often indicative of the level of excess supply over demand, the very low prices ($60 to $70 per SWU) being offered by the Soviets to the West could indicate a significant increase in available enrichment over what has been historically available.
- Our gaseous diffusion plants are looking into a probable future with increased power costs, stricter environmental, health, safety, and security standards, and the possibility of escalating maintenance requirements.
- Although the U.S. now has an approximately four- to five-year lead in AVLIS technology, significant competing programs are underway in both France and Japan. The ability of the U.S. to capitalize on the advantages that AVLIS offers depends on maintaining our technology lead and on being first to the marketplace with low-cost AVLIS.

The Opportunity Offered by AVLIS

Under the circumstances just described—the opening of a valuable price-sensitive market, aggressive foreign competition, and a domestic enrichment capability faced with increasing costs—low cost AVLIS enrichment offers the United States the opportunity for maintaining a strong position in the international market (Figure 6).

Recent progress in the AVLIS Program leads us to the conclusion that AVLIS technology can meet the scheduled goal of production in the mid- to late-1990s with enrichment costs in the range of $25 to $50 per SWU. AVLIS can first complement and then eventually replace our GDPs with a technology that is relatively immune to escalating costs for electrical power and to the increasing emphasis on issues relating to the environment, safety, and health of our communities.

A commitment to AVLIS deployment is needed now. The technology and engineering team is ready to begin serious work this year on activities that directly support deployment. Significant progress has been made in every area of AVLIS technology and recent integrated enrichment demonstrations have verified performance predictions. A highlight of the past year's activities includes completion and review of a detailed design for an expandable 3 to 10 million SWU per year enrichment plant.

Technology Status

The Atomic Vapor Laser Isotope Separation technology consists of three major subsystems: lasers, separators, and uranium processing. The conceptual relationship between the laser and separator systems is shown in a schematic drawing (Figure 7). Copper pump lasers are used to activate the tunable dye laser system. Light from the dye lasers is precisely set to select out the Uranium-235 isotope atoms in the separator. These atoms are collected as product and chemically processed later to be made into fuel for nuclear reactors. Construction and operation of full-scale plant prototypic laser and separator hardware is conducted in the Full Scale Demonstration Facility. Hardware in this facility is configured to prototype the architecture and operating environment of a production facility (Figure 8). Because of the intrinsic modularity of the AVLIS system, a sound basis for projecting plant costs can be provided by building a relatively small number of components of plant-like hardware. A separator module (Figure 9) and two copper laser "corridors" are shown in operation (Figure 10). This modular approach has the added advantage of allowing continuous upgrading and value engineering of hardware in operating systems, both during the development and demonstration program in our Full Scale Demonstration Facility

(Figure 11), and later in the production facility as well. Key objectives have been met in the AVLIS technology program (Figure 12). Recent progress in the major subsystems (Figure 13) includes:

- Doubling of the output power of the world's highest average power visible laser system.
- Demonstration, at full scale, of key elements of the uranium separator.
- Identification of industrial-scale chemical processing technologies capable of low cost integration of AVLIS into the fuel cycle.
- Validation of plant design models in integrated enrichment demonstrations.

These accomplishments are summarized below.

Lasers. The initial copper laser corridor was installed in 1985 as part of the intense activities surrounding the Secretary of Energy's Process Selection between the gas centrifuge and the AVLIS technologies. The DOE decision to proceed forward on this selection process was made with very short notice; in thirteen months the lasers were designed, a factory for their assembly was planned and equipped, vendors were selected and educated, and the lasers were installed and operated (albeit with high failure rates). The cost of these lasers was then approximately $250,000 each. A second copper laser corridor was procured and installed during 1987 and 1988. Because significant improvements had been made in the detailed designs and in the quality of the engineering drawings, the second corridor lasers were built for $150,000 each (or 40% less than those for the original corridor), while simultaneously improving their performance and reliability.

Nearly 800,000 hours of operation have been accumulated on the copper lasers during the last four years while operating them on an around-the-clock basis. In the past year, the system operating power level has doubled, to over 6000 W of copper laser power and the system's repetition rate has been tripled. This is the highest average power visible laser system operating in the world today (Figure 14).

Separators. Similarly, in the separator area, significant and exciting progress has continued. This past year, for the first time, the important elements of a separator system were operated at full scale, both in physical size and for specific performance characteristics. The demonstrated separator hardware also meets the requirements of modularity and operability in a plant environment.

Tests with an integrated separator and laser system also successfully addressed key SWU performance and technology objectives. We have once again validated our enrichment models, this time for designs specifically tailored to address issues of low-cost plant operation. The enrichment demonstrations completed this past year form the basis of our plant design activity (Figure 15). Recent tests have also provided the data to support completion of the next phase of the deployment program—fully integrated operation of plant prototypic hardware in the Full Scale Demonstration Facility in 1991/1992. This demonstration can trigger ground breaking and procurement activities for a uranium enrichment plant .

Uranium Processing. Because AVLIS is a metal-based technology, particular attention must be given to the interface between AVLIS and the uranium fuel cycle (Figure 16). Presently, the diffusion plants use uranium hexafluoride gas as the separation medium. Use of the AVLIS metal-based technology does not require costly conversion of uranium ore concentrate to the gas phase, and thus ultimately can further reduce fuel costs to the utilities. Over the past two years the AVLIS Program has identified technologies that can lower the cost of interfacing into the fuel cycle using techniques that have been well established, at production scale, in the aluminum and chemical industries.

At the time when an AVLIS plant first begins operation, much of the world-wide enrichment capacity will still be based on use of uranium hexafluoride gas. Because the transition to an AVLIS economy will occur over a number of years, a phased approach to the lowest cost interface with the fuel cycle is planned.

AVLIS Plant Design

As mentioned earlier, a detailed Plant Design Study for an expandable 3 to 10 million SWU per year plant has recently been completed. (For comparison, the Paducah GDP has a capacity of between 11 and 12 million SWU per year.)

Many different capacity criteria may be considered as the basis for sizing an AVLIS plant, such as minimizing the capital investment of the initial plant, building the smallest plant that can achieve a pre-determined enrichment cost, replacing one of the operating gaseous diffusion plants, or aggressively pursuing the price-sensitive market. Fortunately, the inherent features of AVLIS technology—high uranium throughput per unit of floor space (and per pound of installed equipment), and the intrinsic modularity of the subsystems—make low-cost enrichment possible while simultaneously meeting many of the deployment criteria (Figure 17).

An artist's conception of the full 10 million SWU per year plant is shown (Figure 18). A detailed parameter review follows (Figure 19). The plant is deployable in ~3 million SWU per year increments, and covers the market product assay range of ~2% to 6%. This plant design contains 685,000 square feet of building area, only 10% that of the Paducah gaseous diffusion plant with similar capacity. The main process building in the center of the drawing is designed to house the lasers and separators, and their refurbishment areas. The facility for product purification and conversion to oxide is shown in the rear right corner. This study included an adjoining feed conversion facility which is shown on the right.

For the recent study it was assumed that the AVLIS plant is located at an existing GDP site which allows use of a number of shared facilities. Design considerations included applicable local, state, and federal licensing requirements, International Atomic Energy Agency (IAEA) guidelines, and DOE general design criteria, including those related to safety, safeguards and security, and environmental documentation.

The projected enrichment cost, for a variety of plant sizes and assumptions for the interface with the fuel cycle, ranges from $25 to $50 per SWU. Again, this is the lowest-cost enrichment technology known, and compares very favorably with earlier AVLIS plant studies. Technology innovation during the entire course of the development program has allowed AVLIS cost projections to decrease in real terms, even in the presence of inflation, increasingly strict design requirements, and more in-depth design reviews.

From a business analysis point of view, this plant is attractive whether it is deployed by the government, by a government corporation, or by a private venture. When viewed from the international perspective it could have a net positive impact of around $1 billion per year in the U.S. balance of trade.

Because of the faster-than-expected progress that the technical program has made during the past year, the major features of the plan are unchanged even with a reduced FY 90 budget request from that presented last year. The request for the FY 90 budget is $158 million. This request is $10 million above the President's, and is the result of the urgent need for timely AVLIS deployment.

In Conclusion

Progress during the last year has been exceptional. Your far-sighted support of this new technology for the past decade is now being rewarded with the possibility of its early deployment and the continued vitality of the United States Uranium Enrichment Enterprise. The joint LLNL/MMES team is experienced, capable, and eager to proceed with the task at hand. This year, work will be focused around preparations for the 1991/1992 engineering demonstration and completion of the pre-deployment activities necessary for start of plant construction in 1992. Again, if we are to meet this schedule, activities leading to preferred site selection and formation of the deployment organization must begin soon.

AVLIS is the enrichment technology of the future (Figure 23). Our lead over the AVLIS efforts in France and Japan is still approximately five years. However, they are both continuing vigorous pursuit of AVLIS with large and growing programs that are becoming comparable in size to ours. We are now ahead. With your support we can be first to the marketplace.

I want to thank the Committee for its continuing support and for the opportunity to appear before you today.

The role of AVLIS in the U.S. Enrichment Enterprise

Today, more than ever, AVLIS technology provides the basis for a continuing, strong, U.S. uranium enrichment capability

- The international market remains highly competitive
  - Demand growth is slow; supply exceeds demand
- Foreign enrichers are expanding capacity and continue to market aggressively
  - To our foreign customer base
  - And, at an increasing level, to our domestic utilities
- Significant concerns continue to exist regarding the future competitiveness of our gaseous diffusion plants
  - Escalation of both power and non-power costs

Commitment to deployment of an AVLIS uranium enrichment plant in the mid-1990s will strengthen the United States' position in the international enrichment market

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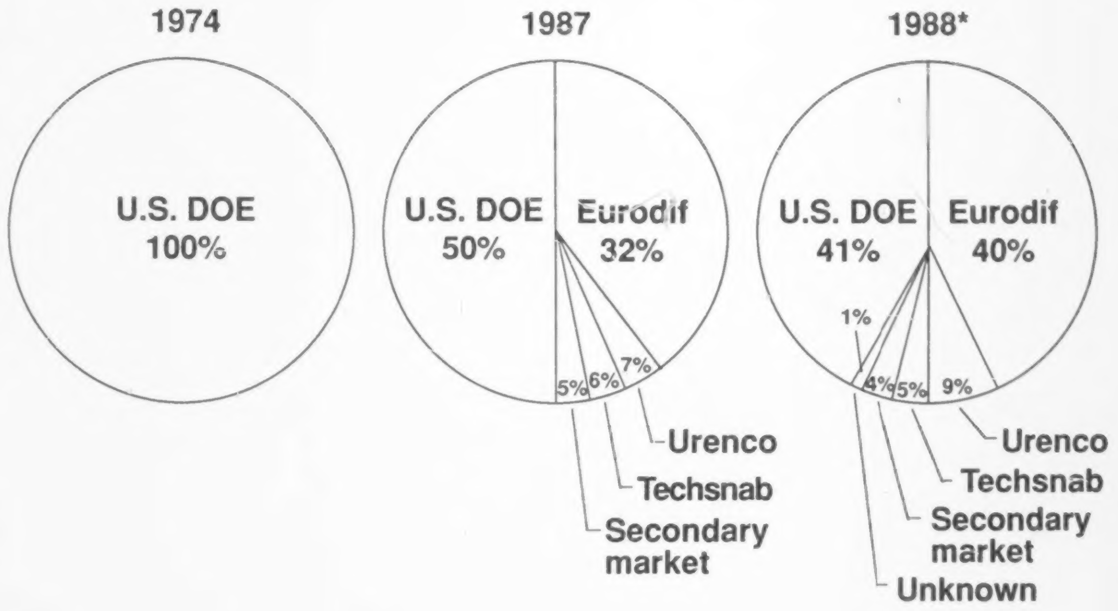
14BM

Figure 1

U.S. Uranium Enrichment Enterprise market share



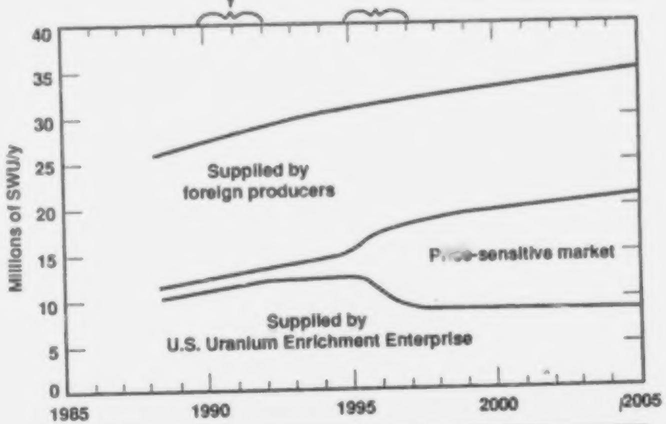
* Preliminary projection

Figure 2

Market considerations form the basis for AVLIS planning

- Customers will need deliveries for currently uncontracted services totalling 10–12 MSWU/y (~$1 B/y)
- Many of these customers will complete contract negotiations for their post-1995 needs

The future
uranium enrichment
market



- A billion dollar per year price-sensitive market appears in 1995 and beyond
- Contracts for this market, which could determine our market share well into the next century, are likely to be signed in the early 1990s

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1463M

Figure 3

The present U.S. enrichment capability—gaseous diffusion plants (GDPs)

Uncertainties in the future cost of enrichment for the GDPs is increasing

- Electricity costs for these power-intensive plants are likely to rise
  - Impending acid-rain legislation
  - Continuing decrease in the excess electrical generating capacity

- Non-energy costs are rising
  - Increasingly stiff safeguards and security, environmental, safety, and health regulations
  - Potential for increased maintenance costs as the plants continue to age

c.5.1.0289.0467
14BM

Figure 4

Foreign enrichment competition is increasing

- Eurodif (with ~11 MSWU/y)
- Urenco (with ~2 MSWU/y and aggressive expansion plans)

Continue to serve their equity partners and to pursue new U.S. and foreign business

In addition, new competition threatens our Enrichment Enterprise

- Japan
  - 1.5 MSWU/y centrifuge plant now in construction
  - Advanced technologies including chemical exchange and AVLIS are heavily funded
- The USSR has recently become involved in much more aggressive marketing, supplying European customers, and very likely, through flag-swapping, American customers as well
- The French AVLIS program—SILVA
  - Deployment continues to be promised for the late 1990s

Figure 5

The opportunity offered by AVLIS: meeting market needs

- AVLIS continues to project the lowest-cost enrichment known, in the range of $25–$50/SWU
- Enrichment demonstration with full-scale hardware in 1991/1992
  - — Timed to coincide with anticipated utility decisions for their post-1995 enrichment needs
- Initial operation of AVLIS production facility in 1995/1996
  - — Timed to compete for the price-sensitive market of the mid-to-late 1990s

Deployment activities can now proceed in parallel with engineering development work

Figure 6

Atomic vapor laser isotope separation (AVLIS)

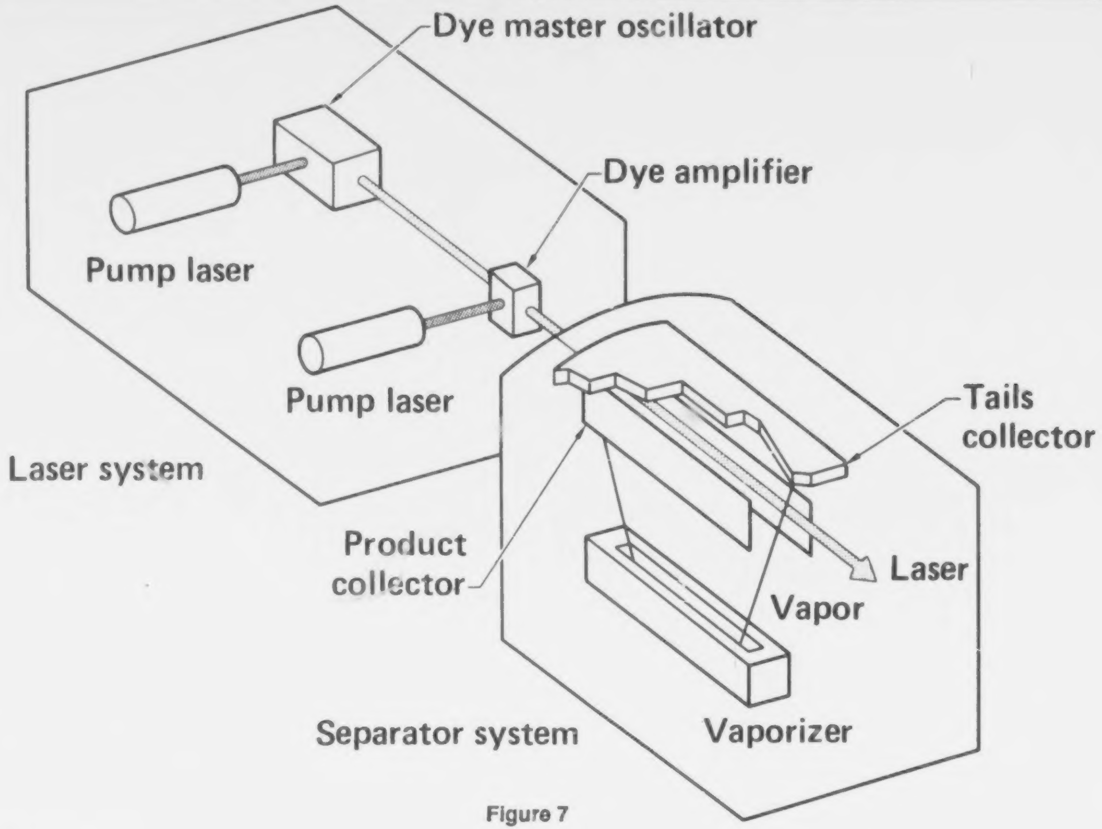
Dye master oscillator
Dye amplifier
Pump laser
Pump laser
Laser system
Tails collector
Product collector
Laser
Vapor
Vaporizer
Separator system

Figure 7

30-01-0282-0328D

Atomic Vapor Laser Isotope Separation (AVLIS)

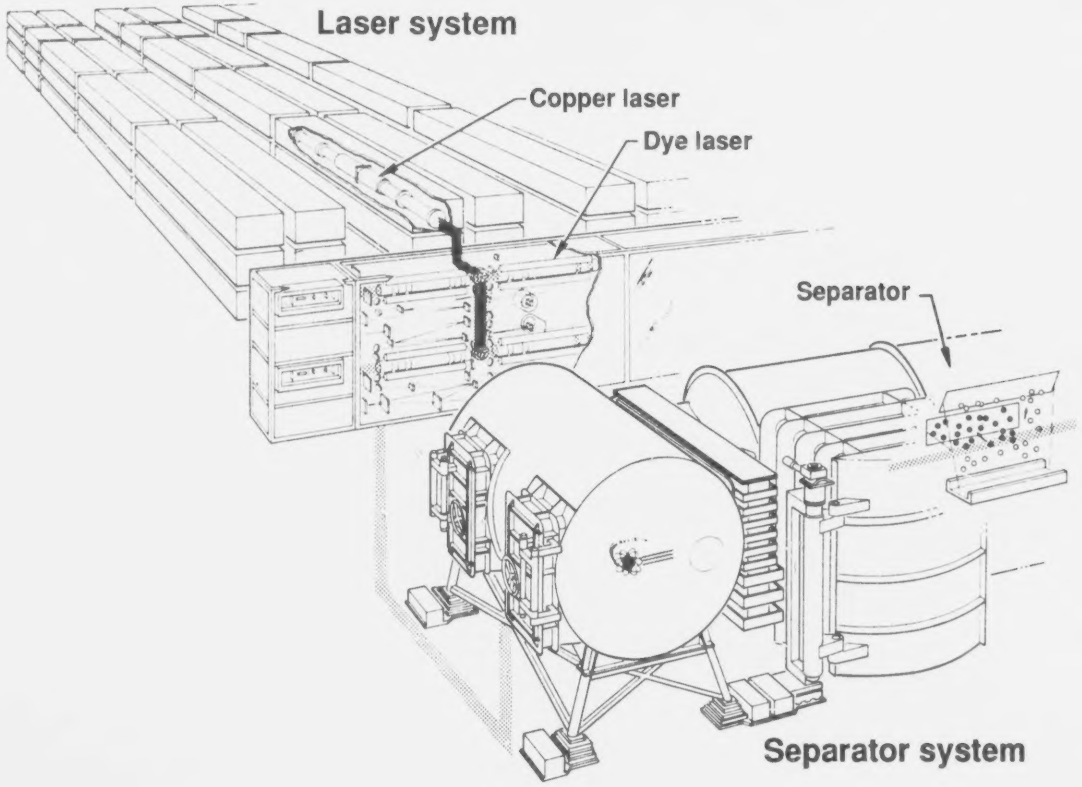
Laser system
Copper laser
Dye laser
Separator
Separator system

Figure 8

30-00-1288-6295-A

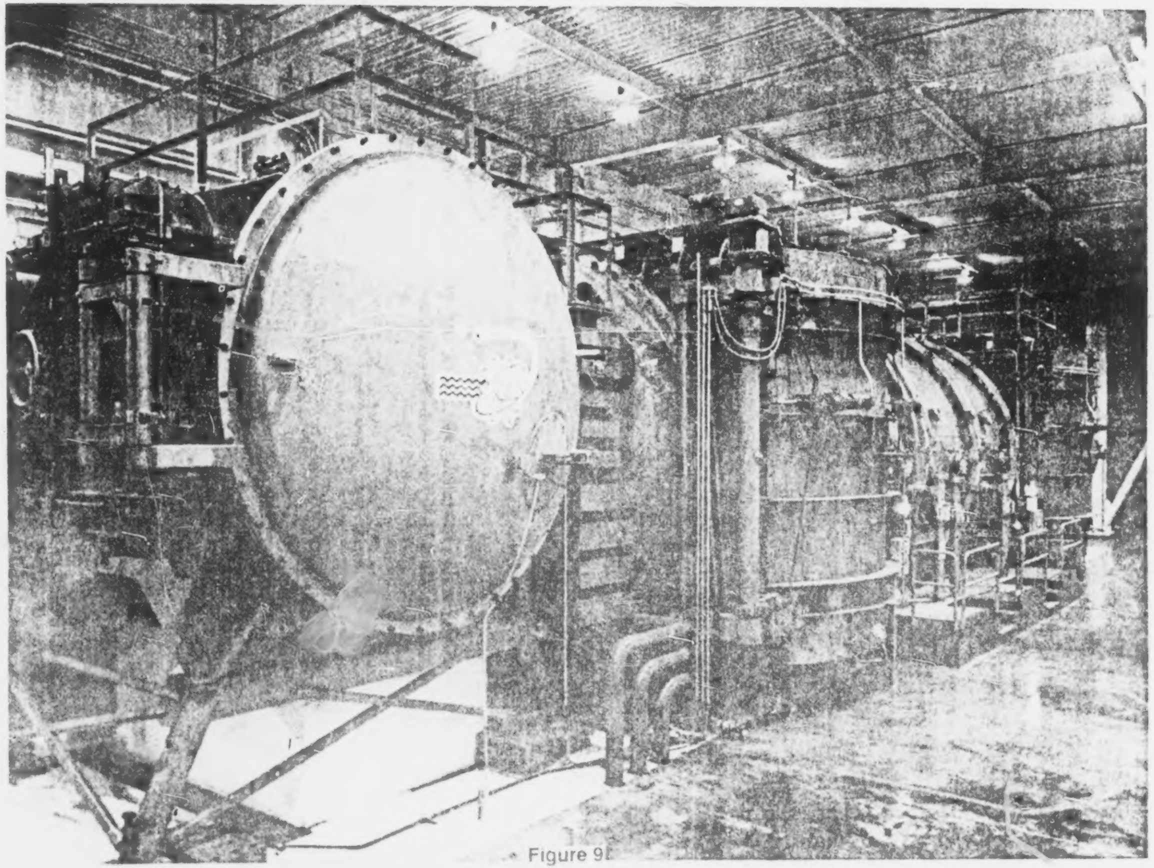

Figure 9

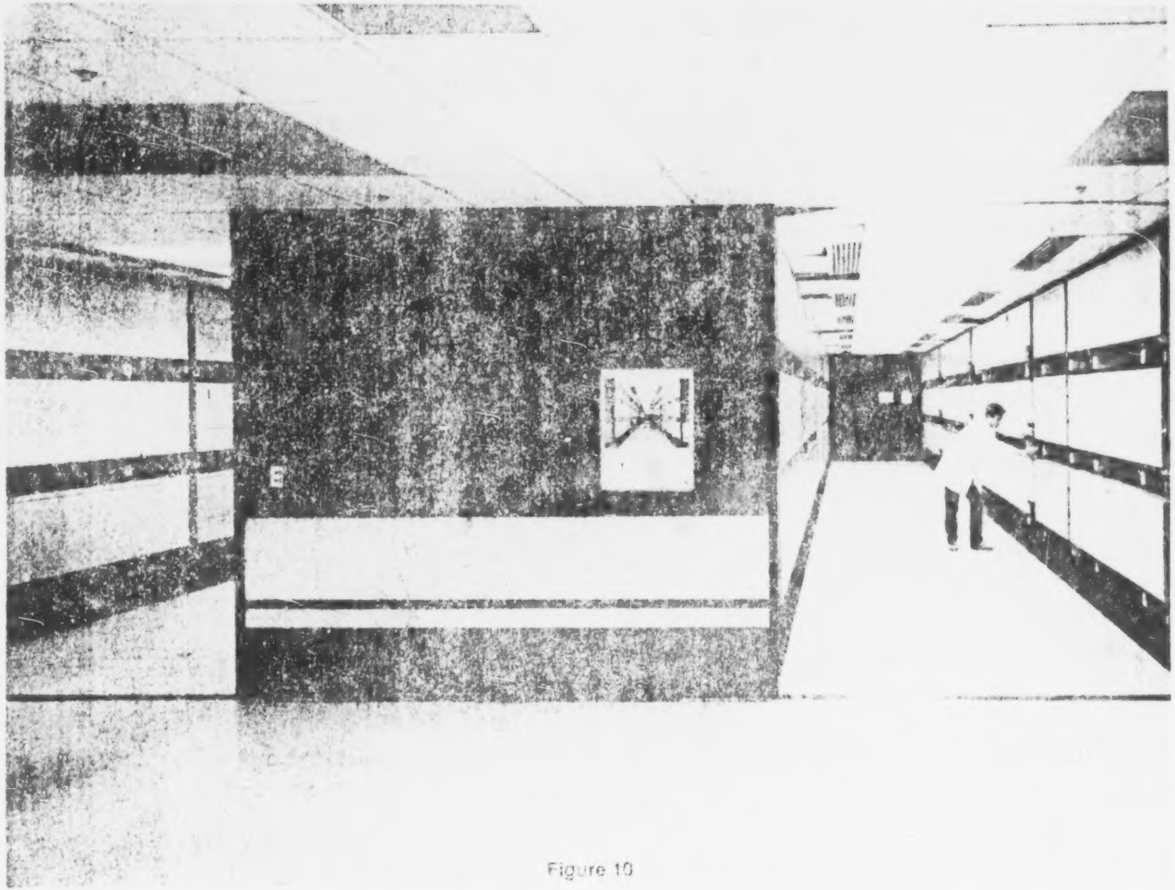

Figure 10

LIS facilities at LLNL

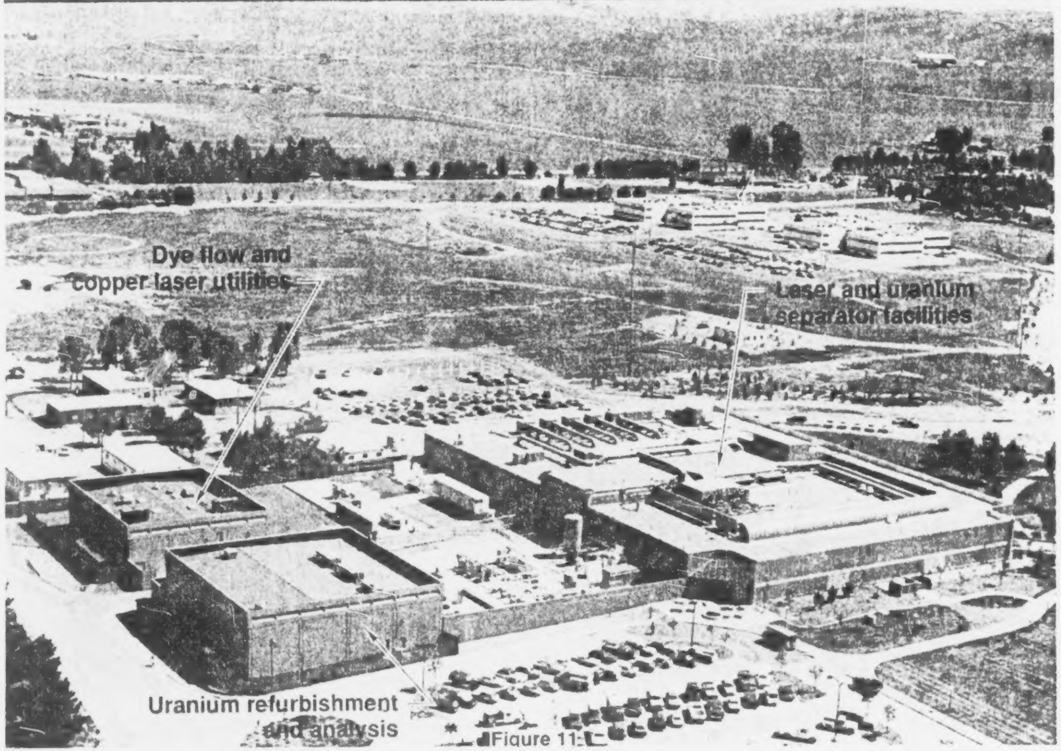
Dye flow and
copper laser utilities
Laser and uranium
separator facilities
Uranium refurbishment
and analysis

Figure 11:

30-03-0587-6056

3/88

Progress in the AVLIS Program

Key objectives have been met in all areas of AVLIS technology. Because of this progress, the U.S. is technically well positioned to meet the market need for a competitive, low-cost production facility

- Laser system
  - General design concept has proven appropriate for plant application. Significant improvements have been made in power level, life, design simplicity, optical transport efficiency, and cost reduction.
- Separator system
  - Design refinements for the plant separator have resulted in simpler design, more resilient operating plan, and net overall lower contribution to enrichment cost
- Integrated enrichment
  - Multiple runs under stable conditions have verified enrichment performance
- Chemical processing
  - Technology appropriate for the metal-based AVLIS process has been identified and is being developed. It could offer further reduction in fuel costs to the utilities.

Figure 12

11/28/88MLS-1G

02/14/89

FY88 Technology Program met all major milestones

- Progress in the three major subsystems included
  - Doubling the output power of the world's highest average power visible laser system
  - Demonstration, at full scale, of key elements of the uranium separator
  - Identification of industrial-scale chemical processing technologies capable of low cost integration of AVLIS into the fuel cycle
- Validation of plant design models in integrated enrichment demonstrations

c.5.1.0289.0472

Figure 13

Laser system progress in FY88

- The Laser Demonstration Facility is the world's highest average power visible laser system
  - Supported multiple integrated enrichment demonstrations
  - Copper laser power doubled to over 6000 W
  - System repetition rate tripled
- Copper laser value engineering program has reduced costs ~40% while
  - Maintaining reliability
  - Increasing performance

Figure 14

Major AVLIS Program accomplishments—integrated enrichment demonstrations

Enrichment series—summer of 1987

- Integrated demonstrations in half-scale separators achieved
  - — Continuous, steady-state isotopic separation for more than 1-1/2 days at predicted product assay
  - — Near plant design uranium vaporization rate and processing of 0.6 metric tonnes of uranium feed
  - — Plant design laser illumination

Enrichment series—summer of 1988

- Continued performance demonstrations at double the laser power and triple the repetition rate
  - — Successfully addressed key SWU performance and technology objectives
  - — Results form the basis for current plant point design

These demonstrations have provided a sound basis for predicting AVLIS enrichment performance

Figure 15

AVLIS in the nuclear fuel cycle

- Introduction of AVLIS enrichment must accommodate continuity in utility fuel cycle planning and contractual arrangements
  - — Existing industrial capabilities and contractual realities may require AVLIS to accommodate existing UF_6 enrichment interfaces
- During the past two years, standard industrial processes have been identified that can significantly reduce the interface costs of AVLIS with the fuel cycle
- Initial small-scale demonstrations of metal production and product purification have been successful

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[illegible]

Figure 16

Inherent features of AVLIS technology make a low-cost enrichment plant possible

- An AVLIS plant is characterized by high uranium throughput per unit of floor space and per pound of installed equipment
- As a result, the capital contribution to AVLIS enrichment cost is particularly low
- With a low capital cost process, the plant can be designed to operate with relatively short-lived hardware components and still maintain low overall enrichment cost

Hardware designs and component lifetimes necessary for a low-cost AVLIS production facility can be achieved and demonstrated in the relatively near term

Figure 17

Uranium Enrichment Plant

MARTIN MARIETTA

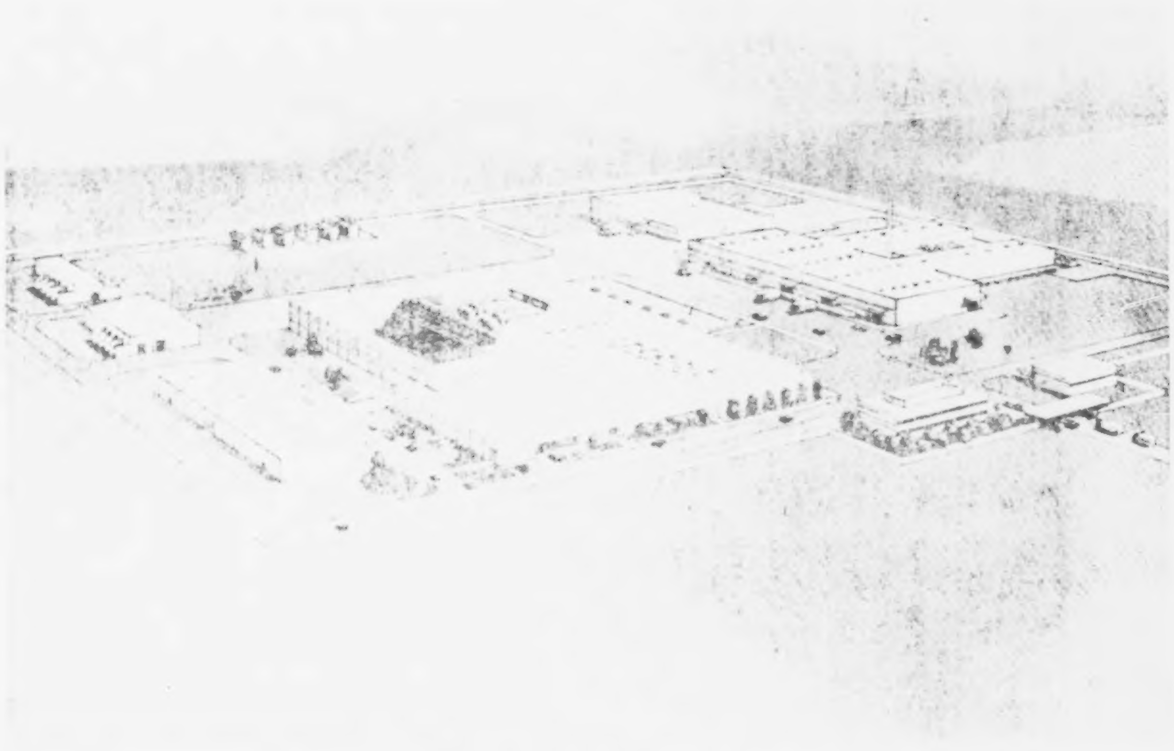


Figure 18

30-00-1088-63724

AVLIS uranium enrichment plant

A design study for an AVLIS enrichment plant that responds to the needs of the marketplace has recently been completed

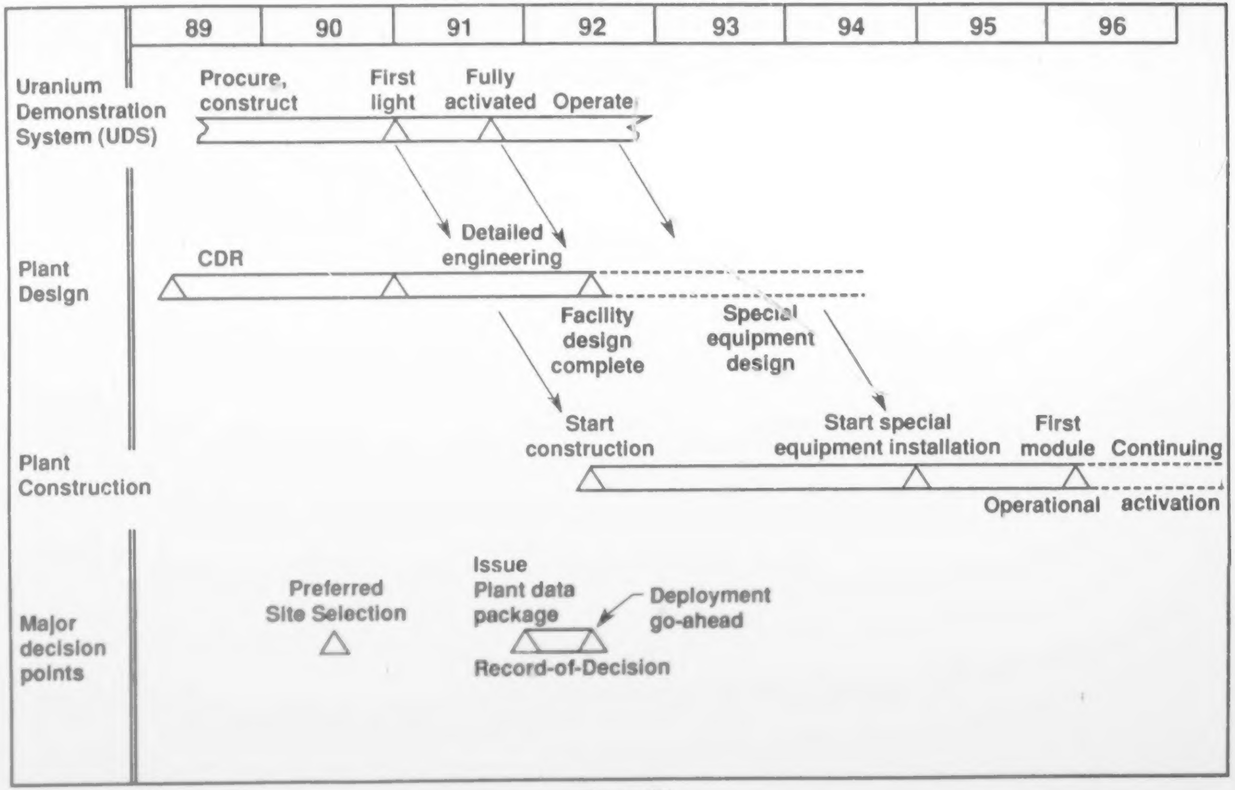
● Initial production date	1996
● Site	Shared/diffusion plant
● Capacity	Expandable to 10 MSWU/y
● Product assay	2%–6%
● Staffing	Equivalent to diffusion plant
● Factory SWU cost	$25–$50

These operating parameters and costs are representative of those expected for a future AVLIS plant

c.5.1.0289.0453

Figure 19

AVLIS Program recommended plan



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[illegible]

Figure 20

The next steps toward AVLIS deployment

- Development of a viable deployment plan, including financing and construction of an AVLIS plant
- Demonstration of AVLIS enrichment with full-size hardware in 1991/1992
- Establishment of a capable deployment organization, including
  - Core staff from the Demonstration Team
  - Additional business and project expertise
- Site selection
- Continuation of plant deployment studies
  - Design studies
  - Preparation for NRC, EIS, state and local interfaces
  - Safety and safeguards studies

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13BM

Figure 21

AVLIS budget request ($M)

	FY89	FY90	FY91
FY90 President's Budget FY91 DOE Planning Guidance	127	148	186
This year's request for an FY92 plant construction start	127	158	186
For reference: Last year's request for an FY92 plant construction start	143	173	173

The FY90 budget request reflects both the faster-than-expected progress in FY88 and the urgency to bring AVLIS to the marketplace

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14BM

Figure 22

The AVLIS Program — 1988 status, 1989 status

- AVLIS technology, progress and outlook are sound
- AVLIS is needed by the U.S. by 1995–1996
    - Foreign competitive pressure is increasing on uranium enrichment
    - Energy security and balance of trade require the U.S. to remain competitive
    - GDPs will probably be noncompetitive in mid- to late-1990s
    - Price sensitive market grows rapidly in mid-1990s
- LLNL/MMES AVLIS team is ready
    - Full scale demonstration in 1991/1992
    - Plant design activities in 1989, 1990

AVLIS is the enrichment technology of the future; we can be first.

Figure 23

Mrs. LLOYD. Thank you, Dr. Davis, and if you would submit a corrected version of the table for the record as well.

Dr. DAVIS. I will.

Mrs. LLOYD. Dr. Merriman, please proceed.

STATEMENT OF DR. J. ROBERT MERRIMAN, VICE PRESIDENT, AVLIS AND WORK FOR OTHERS, MARTIN MARIETTA ENERGY SYSTEM, INC.

Dr. MERRIMAN. Madam Chairman, Members of the Committee, I would like to thank you for the opportunity to speak to you today on a very important subject; that is, deployment of the United States' advanced uranium enrichment technology.

Uranium enrichment is an essential step in the commercial nuclear fuel cycle and in the supply of special nuclear materials for national defense purposes. Unfortunately, the United States has lost enriched uranium market share consistently during recent years.

Because, as you have noted, Madam Chairman, uranium enrichment is such an important function in the areas of national security, energy security, deficit reduction, balance of trade, nuclear nonproliferation, and American jobs, it is essential, I believe, that this function be healthy and vigorous over the long term.

I am very concerned about the continuing erosion of our sales base. I believe our country's uranium enrichment program is at an important crossroads today. The total amount of future business which is uncommitted appears to be growing at an alarming rate in the post-1995 timeframe, most of this resulting from shifts away from firm commitments to DOE.

During the mid to late 1990s, we currently project that over 10 million separative work units per year, a number which is about equal to the capacity of the Paducah Gaseous Diffusion Plant, will be open in a buyer's market. The competition for this business will continue to be very intense.

To meet this threat, I believe the following actions are needed:

For the near term we recommend, first, continued emphasis on the excellent cost reduction efforts underway at our gaseous diffusion plants.

Second, expanding the use of unfirm spot market electricity at the gaseous diffusion plants.

And, third, providing improved flexibility in the use of revenues for the gaseous diffusion plants so that we can match production with demand.

For the long term a number of actions, which begin with a visible and immediate commitment by the government to deployment of our advanced enrichment technology, AVLIS, are essential. The deployment objective we recommend is to have substantial low cost AVLIS production capability in place by the 1996-97 time frame to allow the United States to win the uncommitted business that is available at that time.

If prompt action is taken, the United States is well-positioned to meet the challenges of a lasting healthy uranium enrichment program. Our AVLIS technology is the world's most promising uranium enrichment technology, with projections of costs which are on the order of half the average cost of gaseous diffusion, well below what is possible with any other technology.

In his statement Dr. Davis of Livermore has summarized the technical status and plans for the AVLIS program. As you may know, Oak Ridge has played a key role in AVLIS since the early days of the program and continues to be deeply involved in several important areas.

Dr. Davis' presentation was made on behalf of the Livermore/Martin Marietta team. We fully support his recommendations. Livermore and Martin Marietta both believe that AVLIS should now be directed toward deployment. The technology is ready to move forward, and there are both market needs and opportunities which must be addressed now if this country is to have a healthy uranium enrichment program in the future.

Reflecting this deep conviction, the Director of the Lawrence Livermore National Laboratory and the President of Martin Marietta Energy Systems jointly recommended the following in a recent letter:

First, that the United States AVLIS program be directed toward deployment, with an objective of initial production in 1996.

Second, that major demonstration results from prototype systems be available in 1991, when utilities will be making purchasing decisions for the mid-1990's.

Third, preferred site selection, environmental impact statement, and other activities related to establishing the plant design and the operating framework be completed on an urgent schedule so that construction can be started in 1992.

Fourth, that the program management be transitioned to the industrial partner, who will direct the deployment with the entrepreneurial commercial perspective we believe is important.

And, fifth, that the deployment organization, including a core staff from the current Livermore/Martin Marietta AVLIS team be formed promptly.

In conclusion, I note that for a number of years we and/or Livermore have come before this committee and received your strong support for development of the AVLIS process. This support has been vital and is greatly appreciated.

We have looked forward for many years to the day when we could report that your confidence and investment in AVLIS science and technology have brought us to a point where we could recommend deployment of the process. That day is now here.

We are excited about the opportunity we have to assure the long term health of an important national endeavor and to realize the benefits of a significant technology investment the country has made.

Uranium enrichment began in the United States, and I sincerely hope that this doesn't become another industry which loses a high tech race to some other country.

Our uranium enrichment technology base, our production experience and capacity, and our workers are second to none. With these resources I believe we can be successful as the supplier of choice for enrichment customers around the world for many, many years.

On behalf of Martin Marietta Corp., I can state that our company looks forward to the challenges of AVLIS deployment. We are fully committed to the program's success.

Thank you very much.

[The prepared statement of Dr. Merriman follows:]

DEPLOYMENT OF ADVANCED URANIUM ENRICHMENT TECHNOLOGY

Statement prepared for Subcommittee on
Energy Research and Development
House Committee on Science, Space, and Technology
February 22, 1989

Robert Merriman
Vice President
Martin Marietta Energy Systems, Inc.
Oak Ridge, Tennessee

I would like to thank the committee for the opportunity to speak today on a very important subject: deployment of the United States' advanced uranium enrichment technology.

Uranium enrichment is an essential step in the commercial nuclear fuel cycle and in the supply of special nuclear materials for national defense purposes. For decades, the United States has been a dependable supplier of enriched uranium to electric utilities here and in many other countries for use in their nuclear power plants. Nuclear power has emerged as a major source of energy -- providing over 15 percent of the electricity in the United States, 70 percent in France, 30 percent in Japan, and significant fractions elsewhere with over 500 plants around the world either in operation or under construction today. The United States has lost enriched uranium market share consistently during recent years due to fierce competition from European enrichers and a concern by customers that the power-intensive U.S. gaseous diffusion technology used to enrich uranium will ultimately become economically non-competitive. DOE currently has just over 40 percent of a $2 billion-plus/year enrichment services market, and the U.S. government receives almost $500 million/year in revenues from other countries for these services. Uranium enrichment is an important function in the areas of national security (to supply material for nuclear submarine fuel and weapons), energy security, deficit reduction, balance of trade, nuclear non-proliferation, and American jobs. It is essential, I believe, that this function be healthy and vigorous over the long term, and I am very concerned about the continuing erosion of our sales base.

I believe our country's uranium enrichment program is at an important crossroads today. Customers will, this year alone, make enrichment services purchasing decisions concerning $500 million of future sales opportunities. The total amount of future business which is uncommitted appears to be growing at an alarming rate in the post-1995 time frame, most of this resulting from shifts away from firm commitments to DOE. During the mid-to-late 1990s, we currently project that over 10 million SWU/yr (about equal to the capacity of the Paducah Gaseous Diffusion Plant) will be "up for grabs" in a buyers' market.

The competition for this business is and will continue to be intense. In addition to the European plants we have competed with for the last several years, new initiatives are being taken by others. The Japanese have started work on a commercial enrichment plant. It is widely reported that Duke Power and some associates are actively working with one of our European competitors, URENCO, on a project to build a plant on American soil using European technology. Recently, the trade press has speculated that several utilities, including some in the United States, are even pursuing business deals which result in their actually buying enriched uranium from the USSR, to the detriment of U.S. miners and enrichers. And, finally, other countries, especially France and Japan, have active programs underway aimed at development, demonstration, and deployment of advanced uranium enrichment technology.

To meet this competitive threat, I believe the following actions are needed:

- Continued emphasis on the excellent cost-reduction efforts underway at our gaseous diffusion plants. These actions have been pivotal in allowing DOE to reduce its price by about 25 percent in the last few years and offer a price that is competitive in today's market;

- Expanding the use of unfirm spot market electricity at the gaseous diffusion plants (which requires some capital investment);

- Providing improved flexibility in the use of revenues for the gaseous diffusion plants to match production with demand. This area needs special attention since enriched uranium inventories have, as a matter of policy, been reduced in recent years and we now have to produce what we sell;

- A visible and immediate commitment by the government to deployment of the United States' advanced enrichment technology, Atomic Vapor Laser Isotope Separation (AVLIS);

- Continuing the technical success in the AVLIS program that builds the buyers' confidence in our becoming the lowest cost provider of enrichment services;

- Steady progress in AVLIS plant design and construction that shows customers our technology is being deployed in a timely manner; and

- Substantial low-cost AVLIS production capability by the 1996/1997 period to allow the United States to win the uncommitted business which will exist then.

If prompt action is taken, the United States is well-positioned to meet these challenges. Our AVLIS technology is the world's most promising uranium enrichment technology with projections of costs which are on the order of half the average costs from gaseous diffusion -- well below what is possible with any other technology.

The United States has been developing AVLIS since the 1970s under the very able leadership of the Lawrence Livermore National Laboratory (LLNL). Our company has been an integral part of the program since its early days, and we believe that our work in Oak Ridge and at Livermore as a part of the AVLIS team has been of significant value to the program. AVLIS efforts in Oak Ridge include (but are not limited to) the areas of: (1) uranium processing; (2) advanced materials; and (3) plant design studies. During the past year, uranium processing activities have concentrated on constructing and operating laboratory and engineering scale equipment to demonstrate the feasibility of low cost integration of the metal-based AVLIS process into the nuclear fuel cycle. We produced uranium metal via electrolytic reduction in a bench-scale test unit this year, and also experimentally validated solvent extraction techniques for product purification. Systems studies continue to indicate that metal-based processing has the potential to reduce nuclear fuel costs significantly in addition to the cost savings realized with the AVLIS enrichment step itself. During the next year, emphasis in this area will be placed on continuing engineering-scale tests and initiating design and procurement of large-scale prototype equipment.

Oak Ridge also continues to make major contributions in the fields of advanced materials development and plant design studies. Results from materials test chambers operated in Oak Ridge have been instrumental in significant engineering improvements in the AVLIS separator, and a substantial engineering effort is being mounted to support the conceptual design of the AVLIS production plant.

AVLIS has successfully withstood, on the basis of its technical merit and economic potential, a number of intense selection decision reviews. The most recent of these was in 1985, when the Secretary of Energy selected AVLIS as the United States' enrichment "technology of the future." The program has continued to be very successful since that time. The major components and systems have now been demonstrated to levels which provide a confident platform for plant design. Our projections indicate that the basic economic objective for AVLIS ---enriching uranium at half the expected average cost of gaseous diffusion in the mid-to-late 1990s -- can be met. We believe it is time to move ahead to get the technology into production and realize its benefits.

In his statement, Dr. J. I. Davis of LLNL has summarized the technical status and plans for the AVLIS program. His presentation was made on behalf of the LLNL/Martin Marietta team. We fully support his recommendations, and I want to emphasize furthermore that the teamwork between these two organizations has been exemplary over the many years we have worked together.

LLNL and Martin Marietta both believe that AVLIS should now be directed toward deployment. The technology is ready, and, as I have already discussed, there are both market needs and opportunities which must be addressed now if this country is to have a healthy uranium enrichment program in the future. Recently, the Director of LLNL and the President of Martin Marietta Energy Systems, Inc. jointly recommended to the Department of Energy that:

- The United States AVLIS program be directed toward deployment, with an objective of initial production in 1996. Toward this goal, remaining tests and demonstrations would be totally focused on providing the needed engineering data for the plant;

- Major demonstration results from prototype systems be available in 1991, when utilities will be making their purchasing decisions for the mid-1990s;

- Site selection, Environmental Impact Statement (EIS), and other activities related to establishing the plant design and operational framework be completed on an urgent schedule, so that construction can be started in 1992;

- The program management be transitioned to the industrial partner, who will direct the deployment with the entrepreneurial, commercial perspective we believe is important; and

- The deployment organization, including a core staff from the current LLNL/Martin Marietta AVLIS team, be formed promptly.

As regards the preliminary work needed to meet this schedule, I would like to highlight several important near-term activities:

- Completion of the Conceptual Design Report (CDR). The CDR is required as the basis for the FY 1991 Design-Only and the FY 1992 Construction Line Items which we are recommending.

- Preparation of the EIS. This work needs to be initiated early in 1990 and completed to support the EIS Record of Decision by the end of FY 1991.

- NRC Licensing Activities. A dialogue with NRC is necessary to determine the regulatory framework for an AVLIS plant, so that impacts on design, construction, and operation can be well understood and incorporated.

- Evaluation of candidate plant sites. The preferred site must be selected in mid-FY 1990 if the overall schedule is to be met.

- Detailed planning in the areas of safeguards, security, environmental, health and safety. These issues must be thoroughly understood, so that we can provide complete confidence that the plant design and operation will meet all applicable standards.

- Extensive design work on conventional facilities. This is necessary before construction can begin. Designs of special AVLIS hardware are also required to support the conventional facilities design.

- Establishing a comprehensive project management system. Such a system, responsive to the needs of DOE and the program, has to be implemented in the near future.

We have a very demanding schedule, and the work I have just outlined must be completed during the next two and one half years if we are to meet the marketplace window of opportunity for AVLIS, which begins in the mid-1990s.

In conclusion, I note that for a number of years, we and/or LLNL have come before this committee and received your strong support for development of the AVLIS process. This support has been vital and is greatly appreciated. We have looked forward for many years to the day when we could report that your confidence and investment in AVLIS science and technology had brought us to a point where we could recommend deployment of the process. That day is now here. We are excited about the opportunity we have to assure the long-term health of an important national endeavor and to realize the benefits of a significant technology investment the country has made. Uranium enrichment began in the United States, and I sincerely hope that this doesn't become another industry which loses a high-tech race to some other country. Our uranium enrichment technology base, our production experience and capacity, and our workers are second to none; with these resources, I believe we can be successful as the supplier of choice for enrichment customers around the world for many, many years. On behalf of Martin Marietta Corporation, I can state that our company looks forward to the challenges of AVLIS deployment. We are fully committed to the program's success.

Thank you.

PANEL 1 DISCUSSION

Mrs. LLOYD. Thank you very much, Dr. Merriman, for your testimony as well as Dr. Davis was certainly tops.

Dr. Davis, last year your predecessor indicated in his milestone chart that 1991 would be the year that construction would be started on the AVLIS production facility.

Why has this slipped 1 year in the administration's proposed budget?

Dr. DAVIS. Madam Chairman, I believe there is maybe a misinterpretation of the chart involved here.

Mrs. LLOYD. OK.

Dr. DAVIS. There is a line called plant construction, and a portion of that is called design, and you will note from the chart in the testimony the construction start was in 1992, as testified by Dr. Emmett.

I think the possible misinterpretation was that the whole line was labeled plant construction.

Mrs. LLOYD. OK.

Dr. DAVIS. And just to add one more thing, the $10 million supplemental over the President's budget that we are requesting is the $10 million referred to in your opening statement, and that would be devoted toward design activities.

It is our understanding from the Department of Energy that we do not need a line item to expend those initial funds against that particular line in Dr. Emmett's testimony. We will need the line item in fiscal year 1991, however.

Mrs. LLOYD. Very good.

Would it be possible for the Department of Energy to make a preliminary site selection for the AVLIS production plant today?

Dr. DAVIS. For the preferred site? I believe that is possible, you know, in the coming year. I don't know what details they have to take care of to meet the law and the regulations, but from the point of view of the technology there would be no difficulty in doing that.

Mrs. LLOYD. If it had to be financed from current revenues, would there be sufficient funds to support the construction program as you see it?

Dr. DAVIS. I believe that is a question that should be directed to DOE. Of course, it is our feeling that some flexibility in the way of a revolving fund, or something of that sort, that would allow them to make investments in projects like this without drawing it out of their immediate cash flow would be useful in the way it would be to any business.

Mrs. LLOYD. Why can't we just take a bold step—I would like to address this to both of you—for the Department of Energy just to take a bold step and decide to demonstrate the technology through a small part of the deployment plan, forego further demonstration at Livermore and just demonstrate the technology in the first segment of the production plant?

Dr. DAVIS. I believe right now that the situation is that that would cost more time and more money. If such an action had been taken——

Mrs. Lloyd. It would not be economic?

Dr. Davis. No. If such action had been taken perhaps three or four years ago and we had gone down that path; in other words, had a site and a contractor and all of those things been decided on in the 1985–86 process selection that was made between AVLIS and gas centrifuge, I think we could have gone down that path. Given that we have gone down another road, we now have the sunk cost and the investment, and I think it is better to follow in parallel.

And one more thing, the pacing items in the production plant at this point are probably not the technology. They are things such as site selection and environmental impact statements, that sort of thing.

Mrs. Lloyd. Very good.

Dr. Merriman, would you like to respond to this? Dr. Merriman?

Dr. Merriman. I might add that in fact there have been considerable changes made in the program during the last year to accelerate its entry into the marketplace. Compared with previous plans which called for large demonstrations of the technology at Livermore, we now see quite a bit more focus on only doing those things that are on the critical path from an engineering standpoint toward the production plant.

For example, we do not contemplate a fully powered, fully integrated demonstration system at Livermore as we did in early plans. We will do selected prototypes of key laser systems and separator systems at Livermore. We will do the mass balance integrated experiment at Livermore in 1991. We will also do prototype demonstrations associated with feed conversion and product purification in Oak Ridge.

So within the realms of what is possible from a technical standpoint and what is cost effective, I can assure you that we in Livermore are both trying to accelerate the program as much as possible.

Mrs. Lloyd. Do you feel that the Department of Energy could select a preferred site for AVLIS today as well?

Dr. Merriman. Madam Chairman, I am not thoroughly familiar with the DOE procedures that they have to follow. Certainly, from my perspective we need that decision no later than mid-1990 in order to protect our 1996 plant startup date, and I would certainly hope to and encourage as early a site selection as possible so we can more effectively concentrate our engineering resources and our environmental impact statement work and other design activities.

Mrs. Lloyd. You mention in your statement the window of opportunity in mid-1990's.

How do you determine a window of opportunity? How large is it, and what is the time frame this is going to be available, Dr. Merriman?

Dr. Merriman. Of course, as you know, the crystal ball in market forecasting gets pretty cloudy sometimes, but what we try to do is very carefully assess what the needs of the nuclear reactors are going to be out in time and then look at what we expect to be the firm contracts that customers have to satisfy those needs, and based on current trends, it appears that something in the neighborhood of 10 million separative work units per year will be uncommitted in the mid to late 1990's and we make some projections as to why customers appear to be sitting on the fence in that time period, and Dr. Davis mentioned some of the concerns that we see related to electricity cost of gas centrifuge.

Mrs. LLOYD. You feel that our Pacific rim customers still view us as a reliable supplier?

Dr. MERRIMAN. Absolutely.

Mrs. LLOYD. How long do you think this will last unless we can get on with it?

Dr. MERRIMAN. Well, we have, as you know, promised these customers that the United States would be the low cost supplier in the marketplace in the future. That means introduction of AVLIS in the mid to late 1990's, as we have recommended here, and I believe that so long as they see progress toward that objective they will be very loyal customers of the United States enrichment enterprise.

Mrs. LLOYD. That is very good news.

Mr. Morrison.

Mr. MORRISON. Is there any place in this new technology and its development for either shared costs with private enterprise or international cooperation?

Dr. DAVIS. I think there is room for it. I think it is—again international cooperation is a government issue, a policy issue. It is not a technology—there are many countries that would, I think, be highly pleased to cooperate with us on AVLIS technology, and I don't think there is a single country that would dispute the fact that we are the world's leader in that technology and they would love to share it with us and would be quite willing to make significant investments in it.

But that is again a government policy issue, not a technology issue.

Mr. MORRISON. With this being the same technology as the special isotope separation program, your implications are that this is a freebie as far as weapons are concerned?

Dr. DAVIS. I think that is a mutually beneficial investment on the part of the defense and the civilian sector, and we have benefitted in uranium AVLIS by virtue of the defense program, and I think the defense program has benefited by virtue of uranium AVLIS.

Mr. MORRISON. For some reason I didn't catch from either of your testimony the adequacy of the budget numbers in front of us. Would you repeat that for me, please, just very briefly?

Dr. DAVIS. OK. In my testimony we are asking for an additional $10 million over the President's budget in fiscal year 1990.

Mr. MORRISON. That would be to the $158?

Dr. DAVIS. Yes. And that is down considerably from the request made the prior year for reasons that I alluded to.

Mr. MORRISON. That is because of the progress you have made?

Dr. DAVIS. Yes.

Mr. MORRISON. OK. Thank you very much, gentlemen. I appreciate it.

Dr. DAVIS. Thank you.

Mrs. LLOYD. I think it is still my turn.

I don't mean to be at all critical, Dr. Davis. I hope you will not take it in that way, but I do think I need an answer for the record because some have accused Lawrence Livermore of not aggressively bringing AVLIS to production because it is a Federal laboratory and wants to continue research, and I would like for you to respond to this and tell us how we know that these people aren't correct.

Dr. DAVIS. Well, I appreciate that question, and I would like to just digress a bit and say a little bit about the history of the program.

I and, in fact, Mary Spaeth were both recruited to the Lawrence Livermore Laboratory from Hughes Aircraft Co. explicitly to work on the AVLIS program. It was recognized very early that this program was a relatively short term program in terms of normal long range R&D programs the laboratory does. It was also recognized that it required industrial expertise.

In forming the team over the next 11 years, when I was the program leader, we recruited people from around the country—and just to name several of the companies—I mentioned Hughes Aircraft—Avco, Exxon, Westinghouse, and not to mention Martin Marietta Energy Systems, OK—so that if you put all of that team together, I think probably on the order of the top 100 people—say, between 50 and 100 to be on the safe side—have all been recruited from industry and on the average probably have some 10 years or more of industrial experience, and that is the management and leadership of the AVLIS program at Livermore, and it has been our intention from the outset to take it to the production process.

The Director of our laboratory recently signed a joint memo with the president of Martin Marietta Energy Systems, endorsing the notion that he would do anything possible to incentivize the transfer of as much as 100 or 200 people out of the laboratory into a deployment organization once it was formed and properly constituted, that they could be, you know, formally transferred.

And that is our intention. Our ambition is to see this technology get into production probably more than anybody in industry. We have worked on it, many of us, for some 15 years or more. We are highly committed to it, and so our Director has indicated that he has committed to doing whatever it takes to assure that it gets into industry, into production really and not just into industry.

Mrs. LLOYD. I feel you have properly vindicated yourself.

Dr. Spaeth, would you like to add Dr. Davis' comments?

Dr. SPAETH. I guess the only thing that I have to say is along similar lines, and I will make it short.

We have had no other goal in all of the time that I have been working on this process—and I was one of the first of the employees who began working on this process at Livermore—other than to build a production facility. All of our work has been tested against whether or not they were directed toward production goals. All of our people have been highly organized in their thinking around those actions that would be necessary to operate a production facility.

In no way is the characterization of the work that we do at Livermore a fair description as scientific curiosity, or anything like that. We have always and continue to be dedicated to moving toward a production facility.

Dr. DAVIS. Madam Chairman, may I add one last final thing?

I would encourage all of the committee members, staff, anyone to visit Livermore, inspect our facilities, and compare them to industrial facilities, and I think that they will speak for themselves. They are well-engineered, and they are designed along lines that are indicative of what are required in a production facility, not a research laboratory.

Mrs. LLOYD. Dr. Davis, we certainly hope we can visit you before the year is over.

Mr. Wolpe.

Mr. WOLPE. Thank you, Madam Chairman.

I just want to make sure I understand the total dollars that are involved here.

How much has been appropriated to this point, and how much has been spent to develop AVLIS?

Dr. DAVIS. I am not exactly certain of the exact sunk cost in the uranium AVLIS program. Perhaps Mary knows that number and I can defer to her on that.

Dr. SPAETH. Yes. I am trying to think of that number myself. I think it is on the order of around $700 to $800 million since its inception in 1973.

Mr. WOLPE. How much more money will be required before AVLIS can be commercialized?

Dr. DAVIS. I think through the end of the full demonstration it is, as Phil Sewell indicated, approximately $450 million.

Mr. WOLPE. More through the plan commercialization?

Dr. DAVIS. More. That includes the 1989, 1990, 1991, and 1992 budgets.

Mr. WOLPE. OK. What is the estimated cost per SWU of the 1 million SWU per year capacity AVLIS plant, counting development costs and not counting development costs?

Dr. DAVIS. Well, the number for the production plant I indicated in my testimony is $25 to $50 per SWU.

Mr. WOLPE. Twenty-five to fifty?

Dr. DAVIS. Twenty-five to fifty. The range, the reason we give a range, it depends on the capacity of the plant. If we build a low capacity, typically we move up to the higher end of that range.

Mr. WOLPE. I was using 1 million SWU per year capacity.

Dr. DAVIS. Okay. The plant is deployed in 3 million SWU per year increments.

Mr. WOLPE. So the 3 million would be the smallest plant?

Dr. DAVIS. Yes, that is typically the most economic size at the small end, and that would tend to drive us up towards the higher cost numbers.

Mr. WOLPE. And so that would be $50.

Dr. DAVIS. Closer to the $50 if we were at the small size plants.

Mr. WOLPE. And that counts development costs or does not count development costs?

Dr. DAVIS. That does not count development costs.

Mr. WOLPE. If you add in development costs, what does that $50 become?

Dr. DAVIS. I would probably have to do a calculation here, but I think it would add, as Mary is calculating quickly here, approximately $10 per SWU.

Mr. **Wolpe**. OK. What is the estimate—well, then I presume then—or maybe this is not the case because of efficiencies—what would be the estimated cost per SWU of a—if it is in 3 million increments—say a 9 million SWU per year capacity AVLIS plant?

Dr. **Davis**. Well, then it moves down of course closer to the lower end of those cost numbers, and the reason I am—I am not trying to evade the question—the reason this sounds a little vague perhaps is because the way AVLIS will fit into the fuel cycle is yet to be determined. So there is some uncertainty on that low end, whether we would be at 25 or 35, or something like that. I can't state with certainty at this point in time till we have worked out the details of the interface with the current fuel cycle.

Mr. **Wolpe**. OK. Have any analyses been undertaken that are in print at this point of the effects of AVLIS and nuclear arms proliferation efforts?

Dr. **Davis**. There have been a number of studies done on safeguards and security and proliferation issues over the years. Typically, each time a process selection occurred—and there were several that occurred, starting around 1981—there were a number of competing technologies, so-called AVLIS, MLIS, Molecular Laser Isotope Separation, plasma separation process. Each time a selection study was done they were evaluated on their relative merits with regard to proliferation issues, and then subsequently one was done in 1985, I believe.

I don't know if there has been a more recent one. Mary might know the answer to that question.

Mr. **Wolpe**. How did AVLIS come out in that kind of analysis in comparison with others?

Dr. **Spaeth**. We completed probably the most thorough analysis of the impact of AVLIS on nonproliferation in 1985, and there are a couple of points that are very important to notice.

First of all, when you are talking about proliferation, you are talking about Third World countries for the most part because countries which have nuclear weapon capability already are not considered in the category of countries in which proliferation would occur.

Because AVLIS is a very complex technology, it requires a wide range of talents and a big depth of talent. In other words, you have to have technicians, electrical engineers, program managers as well as a whole different range of metallurgists, also very sophisticated atomic scientists.

The ability of a Third World nation to mount that kind of a capability is very unlikely.

Mr. **Wolpe**. Would that be true in Pakistan, India, Brazil, Argentina, for starters?

Dr. **Spaeth**. I think that one has to compare the likelihood that a country of that sort would have the ability to make the investment necessary for AVLIS compared to the ability that they would have to invest in a much simpler technology from which they could use to proliferate, and that would include gaseous diffusion, the use of plutonium from reactors that are somehow or another used for commercial purposes, or gas centrifuge, as Pakistan has well-illustrated.

Dr. DAVIS. Mr. Wolpe, maybe I can add this. The studies show that the cascading to produce highly enriched uranium in these separators is very, very difficult to accomplish. In other words, the refeeding to get higher and higher assays puts higher and higher stresses on the collectors, and the question of how much total mass material would have to be available in the plant in order to produce a relatively small quantity of highly enriched uranium is one of the limitations that the AVLIS process puts on proliferation, and that has been detailed in some of the earlier studies.

In other words, it is not as easy to cascade this process and produce highly enriched uranium as, for example, it is in gas centrifuge plants, by far. Gas centrifuge plants are relatively easy to replumb and produce highly enriched uranium.

Mr. WOLPE. Are you saying that this would not be the option of choice if someone is trying to circumvent the——

Dr. DAVIS. No.

Mr. WOLPE. How easy would it be to detect the development or construction of an AVLIS facility in a Third country once the United States developed and commercialized the technology?

Dr. DAVIS. I think it would be through the tracking of these very special optical components and laser components and just optical electronic devices in general that are not readily available, and these are leading edge areas of competition between Japan and the United States, for example, today. We use special optical fibers in this technology that are pushing the state of the art. In fact, we are pushing the state of the art ourselves in developing some of those. Special optical modulators come into this that are—I can't go much further on that because of classification—that has to do with the way we can efficiently photoionize these atoms, and the ability to develop that technology is literally at the edge of our capabilities, and the Japanese have not—have fortunately not figured out yet how to do it.

Mr. WOLPE. How long has AVLIS been under development? When did this——

Dr. DAVIS. It started with relatively small funding in the early 1970s.

Mr. WOLPE. Early 1970's.

And, lastly, is AVLIS being used or is it planned to be used for plutonium isotopic separation?

Dr. DAVIS. There is currently a project, a defense project, that is planning for the construction of an isotope separation plant, the so-called ISIS project in Idaho, and we are providing the technology for that to Idaho.

I would like to point out that technology, except in the area of the lasers and optical physics and technology, is totally different from the uranium process. The materials handling parts of it are totally different. For reasons such as the fact that plutonium has a very low critical mass, the design of the separators is radically different from those of uranium separators.

Mr. WOLPE. Thank you very much, Dr. Davis, and thank you, Madam Chairman.

Mrs. LLOYD. Thank you very much, Mr. Wolpe.

Do either one of you gentlemen have any further comments, or, Ms. Spaeth, do you have anything further that you would like to add?

[No response.]

Mrs. LLOYD. If not, thank you very much for being with us today, and we will have some questions we would like to submit in writing. We will think of something——

Dr. DAVIS. Thank you.

Mrs. LLOYD. [continuing]. To get you to come back at us with.

But we do thank you for your help today.

Our final witness today is Mr. Charles Montange, from the National Taxpayers Union. Mr. Montange has been before the committee once before and offers the committee important advice on his organization's perspective.

Mr. Montange, we do have your written testimony which will be included in the record in its entirety.

Would you please summarize in your oral remarks and proceed as you wish?

PANEL 2

STATEMENT OF CHARLES H. MONTANGE, COUNSEL FOR NATIONAL TAXPAYER UNION

Mr. MONTANGE. Thank you, Madam Chairman, and Members of the Subcommittee.

My name is Charles Montange. I serve as outside legal counsel for the National Taxpayers Union, on whose behalf I appear today.

NTU is a nonpartisan, nonprofit, public interest organization devoted to protecting the taxpayers' interests against, among other things, unwarranted subsidies and wasteful federal spending.

We are here today to discuss the fiscal year 1990 budget request for civilian uranium enrichment.

After hearing the testimony of Mr. Sewell, I am at somewhat unease on that, for most of his testimony was not to my mind directed so much at the fiscal year 1990 budget as it was at possible legislation that the Department of Energy may introduce at some unspecified time during this Congress, and which they hope may be adopted by this Congress in some form that is close to Mr. Sewell's projections and which will serve to alleviate in his mind and perhaps ours some of the problems that I am going to testify to today.

I will remark in passing, in going through my testimony, on some of the points where we agree or disagree with Mr. Sewell. I will try to correct what I view as some misconceptions that may have arisen as a result of his testimony and also give a summary sketch of the position of the National Taxpayers Union on what the data actually shows has happened with the civilian uranium enrichment program, where it is today and why it got there and what could be done in the future.

For over 25 years the Atomic Energy Act has provided that the civilian uranium enrichment program must recover all its costs from its customers and that it must not depend upon taxpayer subsidies. Section 161v. of the Atomic Energy Act, which is codified at 42 United States Code Section 2201v., specifically requires the DOE to price enrichment services to recover all the costs.

This was consistently interpreted, with the approval of the Joint Committee on Atomic Energy, to include all costs of the approximately $2 billion in plant and equipment turned over to the program, including imputed interest.

Those are found in criteria or regulations adopted for the program submitted to the Joint Committee to lie before it. They were published in 1966 in the Federal Register. They are also found in hearing volumes.

Rather than recovering these costs for the Treasury, they were, at the request and with the full support of the nuclear utility industry, reinvested in additional plant and equipment. The reinvestment involved a doubling of the size of the existing gaseous diffusion plants and, in addition, the construction of a gas centrifuge plant.

In addition to the reinvestment of these assets, Congress made hundreds of millions in additional net appropriations to the program.

According to the General Accounting Office, DOE has failed to recover some $8.8 billion in costs as of April 1987.

The Department of Energy in the Federal Register declared that as of September of 1985 the unrecovered cost level was $7.5 billion.

The reason for the difference between the 7.5 billion in September '85 and the 8.8 billion figure for April 1987 is not a difference in methodology; it is rather an addition of imputed interest and additional factors adding to the original sum.

The sum has gone up since then, for there have been no significant additional repayments to the Treasury since April of 1987. We now understand by rough calculation that the amount actually owing under the methodology adopted in 1966 is approximately $10 billion.

A major utility lobbying group, the Council for Energy Awareness, has admitted that this computation is "technically correct."

The Department of Energy, as I have noted, in essence agreed in the Federal Register of 1986—I might also note that was in the budget documents that the President submitted to the Congress in 1986—the Department of Energy also agrees, but has arbitrarily, in our view, and unlawfully, according to the General Accounting Office, purported to write off all but about $3 billion of these assets.

Now, we understood when they took this write-off in 1986 that they would in fact price to recover that amount. It is our understanding now from the fiscal year 1990 budget—and which is one of the reasons we are quite upset today—is that they are now planning to recover only $364 million, an additional writeoff of assets to approximately 10 percent of what they had written them off to and said they would recover in 1986.

We are rather curious to learn what the major shift is in the last two years that occasions this need for an additional 90-percent writeoff.

So far the total cost to this program has now been in approximately the $10 billion range for the unrecovered costs. In addition to that, one would add the cost to decommission the three gaseous diffusion plants, which DOE has now acknowledged—and this is the first time I have heard a public acknowledgement—but that they will be set for decommissioning or obsolete within the next 15 years.

Not a cent has been recovered for that to date. The cost to decommission those things is, we are told now today, $1 to $3 billion. The estimates that I have seen are $1 to $3 billion per plant.

One of the motivating factors which I gather from the testimony this year and last year for the writeoffs and the price reductions that DOE has taken is competition. There is no question but that there is additional competition. It flows from DOE's predecessor's contracting policies in the 1970's, but what DOE has failed yet to focus on is what it can do, given this new marketplace it perceives, to maximize recovery for taxpayers of the value of these assets. It has really yet to come to grips with operating this facility in what they like to claim they are doing, which is a businesslike fashion.

We have heard today from Lawrence Livermore and Martin Marietta that approximately 10 million SWU's per year, as I understand it, of enrichment demand is up for grabs starting in the mid-1990's.

According to the Congressional Budget Office—and that is the only office that has yet released public figures—there are only about 4 to 6 million SWUs of excess capacity abroad in the mid to late 1990's. That means that no matter what DOE charges—no matter what DOE charges—it is going to get at least half that uncommitted business and presumably keep what business it has.

We are the producer, according to the statistics, with the real excess capacity in the market. What that means is that you can raise your price and make the price stick.

So the bottom line from all that is there may be competition, but as General Motors and Ford have pointed out, the fact that there is competition doesn't mean that you just continue to lower your prices. It means you look at your market, figure out a price that will maximize your profits, and price at that.

Now, as we see in the auto market, that means that despite foreign competition the price for domestic autos goes up occasionally. It might not go up 50 or 100 percent each year, but it goes up 7, 10, 15 percent per year. They try to price to maximize their profit.

In the case of the uranium enrichment enterprise, where we have approximately $10 billion in losses and a nonrecovery of any funds so far for decommissioning, it is not so much a question of pricing to maximizing your profit; it is pricing to minimize taxpayer losses.

What we really need then is some policies and some really conscientious oversight aimed at getting this program finally to begin to minimize taxpayer losses, and the time is running out. The longer we dally around with the program, the less our opportunities are to really begin to recover anything.

Now, the DOE's proposed budget, as I said, effectively writes the approximately 10 billion in unrecovered costs all the way down to $364 million. That is roughly a 96 percent write-off. Only a couple years ago they said they would recover at least $3.5 billion.

As to that $364 million that DOE would allow to remain on the books, the agency does not yet propose to return any of it to the Treasury. Maybe DOE will pay a bit of it in the future. It is unclear. Judging from Mr. Sewell's testimony today, what they plan to do is give the government paper. A government agency is going to give the Treasury Department paper, called stock, and that may or may not be worth anything in 10 years. We will just have to see.

There is an English philosopher who said that "In thinking of matters human and divine, it is good to begin to assume the future will be like the past."

Now, if we didn't get anything in the past—indeed, we sustained a $10 billion loss—it is with trepidation that we review the future with a probable repeal of the full cost recovery requirement and a bunch of paper from the DOE.

In any event, all DOE does propose for the Treasury in the coming year is a $29 million payment of what they call interest. That works out to 0.3 of a percent return on the taxpayer investment.

Now, I think the inflation this year—or last year, as I am told, is 4.4 percent. So you can see we are steadily losing ground.

We believe that at least a return on the level of the inflation rate would be in order on the investment if we are going to try to avoid massive taxpayer subsidy, which clearly does violate the law.

Turning to the question of the decommissioning costs, the agency has finally proposed to collect some money, but only $40 million. Now, it would take, we think, about 75 years at that rate to collect enough money to actually recover those decommissioning costs. The agency has indicated that it will require—or that the plants will all three be obsolete and thus eligible for decommissioning in a mere 15 years.

Since no money has been collected to date and since no mechanism has yet been set up to segregate the money that they are going to begin to collect and since the money they are going to begin to collect is itself inadequate to cover the decommissioning costs, we are somewhat troubled. We are troubled that in addition to the $10 billion in unrecovered costs that we are being asked to absorb unlawfully to date we are going to absorb the umpty-ump billion additional dollars of decommissioning costs, which we can look forward to in the future.

If the agency were going to actually recover a decommissioning fund, it would probably be in the order of five to seven times the amount that they have actually got in their budget per year until the amount is accumulated.

Now, DOE's budget document and Mr. Sewell's acknowledgement in his testimony indicate that the budget is really not at all based on current law, but it is based on legislation that DOE hopes to introduce in the future.

That legislation resembles in its broad contours, as indicated in the 1990 budget that DOE has submitted, in its broad contours the legislation adopted by the Senate last Congress. That is S. 2097.

Now, the Congressional Quarterly has termed the Senate bill upon which this DOE enrichment budget appears to be based as "bailout legislation."

That term was used by Congressman Wolpe today in his description of S. 2097, and Mr. Sewell agreed that that was an accurate summation of the legislation.

Now, we think that—we are very troubled, we are very concerned about the nature that this legislation that DOE is preparing will take. If it is at all like 2097, it is not going to reform the DOE program at all.

S. 2097, as the Chairwoman may recall, had essentially no language in it to protect taxpayer interest whatsoever. It repealed the full cost recovery requirement and substituted hortatory language to a new corporation which told the corporation to go out into the world and do what you want to do, maximize your market share, think about new technology, you might think on occasion about doing something to recover some money for the Treasury but that is not necessarily your first objective.

That is kind of a blank check—a blank check to our pocketbooks.

In a letter dated November 6, 1985, then Chairman Fuqua of the Science and Technology Committee, this Committee, and Chairwoman Lloyd informed Mr. Bill Lee, who has long been a utility industry proponent of a broad writeoff, that "a significant sum" is "owed to the government" by the domestic civilian uranium enrichment program and "all costs to the government should eventually be recovered."

If any costs are to be recovered, the process has to start. The time to start is now with this fiscal year 1990 budget. What DOE has proposed to do so far is very little. In my written testimony I say "too little," and it may well be much too late.

The United States faces an enormous budget deficit. Add to this the additional $40 to $120 billion bailout burden for the savings and loan industry, with which various proposals would saddle federal taxpayers.

DOE has recently announced it is facing tens of billions of dollars in unfunded liabilities for environmental remedial action in its other programs. Taxpayers will have to divvy up for that, too.

One can hardly imagine a more propitious time to begin collecting some significant portion, anyway, of the $10 to $19 billion owed to taxpayers in unrecovered costs and decommissioning expenses for this program.

Certainly, the billions owing should not be written off or ignored, which one would be doing by simply adopting DOE's fiscal year 1990 proposal.

The National Taxpayers Union accordingly requests that the Science and Technology Committee make appropriate recommendations to the Budget Committee.

We thank you for this opportunity to testify.

[The prepared statement of Mr. Montange follows:]

NATIONAL TAXPAYERS UNION

A NONPARTISAN, NONPROFIT ORGANIZATION DEDICATED TO THE PUBLIC INTEREST

325 PENNSYLVANIA AVENUE, SOUTHEAST   WASHINGTON, DISTRICT OF COLUMBIA 20003   TELEPHONE: AREA CODE (202) 543-1300

BEFORE THE SCIENCE, SPACE AND TECHNOLOGY COMMITTEE
ENERGY RESEARCH AND DEVELOPMENT SUBCOMMITTEE
U.S. HOUSE OF REPRESENTATIVES

OBJECTIONS TO THE PROPOSED FY 1990 BUDGET FOR THE DEPARTMENT OF ENERGY'S CIVILIAN URANIUM ENRICHMENT PROGRAM

TESTIMONY
ON BEHALF OF THE NATIONAL TAXPAYERS UNION

by
Charles H. Montange,
Counsel for NTU

February 22, 1989

THE AMERICAN TAXPAYER ACTS THROUGH NTU

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Counsel for NTU

Madam Chairman and members of the Subcommittee, my name is Charles Montange. I serve as outside legal counsel for National Taxpayers Union (NTU), on whose behalf I appear today. NTU is a nonpartisan, nonprofit public interest organization devoted to protecting the taxpayers' interests against, among other things, unwarranted subsidies and wasteful federal spending

National Taxpayers Union objects generally to the budget for FY 1990 proposed by the Department of Energy (DOE) with respect to the civilian uranium enrichment program. That budget violates the Atomic Energy Act, and embodies considerably more than $ 10 billion in unwarranted and unlawful subsidies by taxpayers for the civilian uranium enrichment program. For over two years, NTU has objected to what amounts to a clear and admitted failure by DOE to obey the law. We reiterate our objection. Each year that DOE delays costs taxpayers roughly one billion additional dollars, and renders more difficult the recovery of the billions already owing.

For 25 years, the Atomic Energy Act has provided that the civilian uranium enrichment program must recover all its costs from its customers and that it must not depend upon taxpayer subsidies. Section 161v. of the Atomic Energy Act, 42 U.S.C. § 2201v., specifically requires that DOE price enrichment services to recover all costs. This was consistently interpreted, with the approval of the Joint Committee on Atomic Energy, to include all costs of the approximately $ 2 billion in plant and equipment turned over to the program, including imputed interest.

Rather than recovering these costs for the Treasury, they were, at the request, and with the full support, of the nuclear utility industry, reinvested in additional plant and equipment.[1] In addition, Congress made hundreds of millions in net appropriations to the program.

According to the General Accounting Office, DOE had failed to recover some $ 8.8 billion in costs as of April 1987.[2] A major utility lobbying group, the Council for Energy Awareness, has admitted that this computation is "[t]echnically ... correct."[3] And the Department of Energy also agrees, but has arbitrarily, and unlawfully, purported to "write-off" all but about $ 3 billion of those costs.[4] We estimate that the amount of "unrecovered costs" has now grown to $ 10 billion. In addition, DOE has failed to recover one cent of the estimated $ 3 billion to $ 9 billion which it will cost to decommission the three gaseous diffusion plants. The total cost to the taxpayers of this program, which for 25 years was supposedly paying its own way, is now $ 13 to $ 19 billion. DOE's uranium enrichment program is a taxpayer dis-enrichment program. Hamlet's claim that "something is rotten in Denmark" is the most applicable literary allusion that comes to mind.

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[1] For example, utilities urged Congress to reinvest in a new enrichment plant (since cancelled) on the ground that "the economic penalties that could be imposed by a shortfall of enrichment capability far exceed the costs that would be associated with a temporary oversupply...." *Future Structure of the Uranium Enrichment Industry, Hearings before the Joint Comm. on Atomic Energy*, 93d Cong., 2d Sess. 175 (1974) (testimony of EEI through Mr. Kuhns). *See also* *Uranium Enrichment Policy, Hearings Before the Subcomm. on Energy Res. & Dev. of the Senate Energy & Nat. Res. Comm.*, 95th Cong., 2d Sess. at 80, 87, 444 (1978) (EEI statements in favor of gas centrifuge and opposing GAO suggestion that investment in additional enrichment capacity be postponed: "the need to proceed rapidly with the planned ... plant is urgent and cannot be overemphasized"); *Uranium Enrichment Policy, Hearings before the Energy Cons. and Power Subcomm. of the House Energy & Power Comm.*, 98th Cong., 1st & 2d Sess. 315-26 (1983-84) (continued industry support). Examples of utility claims that they and not taxpayers would pay can be found in the 1978 Hearings at pp. 75 & 88.

[2] *E.g.*, Statement of Keith Fultz (GAO), before the Energy & Power Subcomm. of the House Energy and Commerce Comm., released April 8, 1987, at p. 1. DOE has admitted that unrecovered costs stood at $ 7.5 billion at the end of September, 1985. *See* 51 Fed. Reg. 3624 (Jan. 29, 1986).

[3] Letter, J. Siegel (V.P., U.S. Council for Energy Awareness) to M. Frazier (Member, NTU Bd. of Directors), June 7, 1988 ("Technically NTU is correct in its assertion of significant 'unrecovered costs'").

[4] *E.g.*, OMB, Major Policy Initiatives 88 (1986) (write-off to about $ 3.5 billion); 51 Fed. Reg. 3629 (Jan.29, 1986). GAO says that the write-off is beyond DOE's authority. *E.g.*, Letter, Comptroller General to the Honorable John Dingell, Dec. 27, 1984; Letter, Comptroller General to the Honorable Edward J. Markey, Feb. 19, 1986.

We now come to the FY 1990 DOE civilian uranium enrichment budget. In that budget, DOE proposes to make a taxpayer catastrophe even worse.

The DOE proposed budget "writes-off" the approximately $ 10 billion in "unrecovered costs" to a mere $ 364 million -- a mark down of roughly 96 %. Only a couple years ago, DOE claimed it needed an unlawful "write-off" to some $ 3.5 billion. DOE has provided absolutely no justification for the additional $ 3.1 billion "write-off" to only $ 364 million. To the contrary, the agency has been claiming it is in an increasingly favorable market position.

As to that $ 364 million DOE would allow to remain, the agency does not propose to return any to the Treasury in FY 1990. Maybe DOE will repay a bit of it in the future, but on the more probable assumption that the future will be like the past, the agency never will. In any event, all DOE proposes for FY 1990 is to pay $ 29 million as return on the taxpayer investment. This works out to a microscopic 0.3 % return on the de facto taxpayer investment of $ 10 billion in the government's uranium enrichment enterprise. At least a 4 % return is necessary simply for taxpayers to hold their own against inflation. But that return is about 14 times more than DOE is proposing.

Turning to the question of the $ 3 billion to $ 9 billion in decommissioning costs, the agency finally has proposed to collect some money, but only $ 40 million. Madam Chairman, it will take 75 to 250 years to recover decommissioning costs at this rate. The three existing enrichment plants will be gone long before even a third of their decommissioning costs are collected. DOE should immediately price so as to assure that all decommissioning costs have been accumulated within 10 years. This works out to something in the neighborhood of $ 300 million per year, minimum -- at least 7 ½ times DOE's proposal.

DOE's budget document expressly notes that it is founded on legislation adopted by the Senate last Congress but not adopted by the House.[5] The Congressional Quarterly has termed the Senate bill, upon which the DOE enrichment budget is based, as "bailout legislation."[6] As is sometimes said in the law of torts, *res ipsa loquitur*: the thing speaks for itself.

In a letter dated November 6, 1985, then-Chairman Fuqua of the Science and Technology Committee and Chairman Lloyd of this Subcommittee, informed Mr. Bill Lee, long a utility industry proponent of a broad "write-off" and substantial taxpayer subsidy, that "a significant sum [is] owed to the government" and that "all costs to the government should eventually be recovered." If *any* costs are to be recovered, the process has to start. The time to start is now, with this FY 1990 budget. What DOE has proposed is far too little, and much too late.

The United States faces an enormous budget deficit. Add to this the additional $ 40 to $ 120 billion bail-out burden for the savings and loan industry with which various proposals would saddle federal taxpayers. DOE has recently announced that it is facing over $ 80 billion in unfunded liabilities for environmental remedial action. Taxpayers will have to divvy up for that disaster too. One can hardly imagine a more propitious time to begin collecting the $ 13 to $ 19 billion owed to the taxpayers by the federal uranium enrichment enterprise. Certainly the billions owing should not be written off or ignored as per DOE's FY 1990 proposal. NTU accordingly requests that the Science and Technology Committee make appropriate recommendations to the Budget Committee.

Thank you for this opportunity to testify.

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[5] The main Senate bill was S.2097, 100th Cong. Its house progeny were H.R. 4934, 4975, and 4489, 100th Cong. NTU supported legislation (H.R. 5181, 100th Cong., sponsored by Congressmen Eckart and Miller) which, in sharp contrast to the Senate bill, would have retained value in the federal uranium enrichment program and would have directed its operation in a business-like fashion for the benefit of its owners, the federal taxpayers. Senators Ford and Johnston recently proposed legislation again embodying, like S.2097, the enormous "write-off" to $ 364 million, and indicating that they intended to re-introduce legislation evidently similar to S.2097. *See* S.83, 101st Cong. and Jan. 25, 1989 Congressional Record at S 405-06.

[6] J. Davis (Cong. Quar.), *'Family' Raises Energy Funds for Pelican PAC*, Oct. 8, 1988, at 2779, 2780.

PANEL 2 DISCUSSION

Mrs. LLOYD. Thank you very much, Mr. Montange.

Certainly, I want you to know that this Member, as well as, I imagine, the other Members of this Committee, want to see the corporation that will be formed, if it is formed, to recover the maximum for the taxpayer. I don't think there is any question there.

Let me ask you a question. You maintain that there is $10 billion owed to the Treasury, is that correct?

Mr. MONTANGE. It is not me maintaining it. I think that is the conclusion of the General Accounting Office and the Office of Management and Budget if you don't take into account the writeoffs that the Department of Energy has taken.

We estimate it at about that.

Mrs. LLOYD. Well, there are certainly many estimates of this charge, but what is your——

Mr. MONTANGE. Our estimate is approximately $10 billion, founded on GAO and OMB technical methodology.

Mrs. LLOYD. Let me ask you, if this money cannot be repaid to the Treasury and go on with the enrichment business, is it your position that we ought to get out of the enrichment business? Is this your proposal?

Mr. MONTANGE. If the money is not repaid to the Treasury——

Mrs. LLOYD. What is your number one goal?

Mr. MONTANGE. Our number one goal is to prevent unnecessary subsidies by U.S. taxpayers to mature industries.

Mrs. LLOYD. Would you like to see the uranium enrichment business out of business?

Mr. MONTANGE. Oh, no. I would like to see a strong, viable, vigorous, self-supporting, profitable uranium enrichment enterprise that would begin to repay the Treasury some of the $10 billion owed to the Treasury and also at least, as a very minimum, absolutely recover for the Treasury the book value of those assets and protect them.

I am very troubled today by the fact that Mr. Sewell's testimony indicated the book value is $3 billion, just of the assets, and that he is distributing at below current prices uranium from the federal stockpile which he hasn't even included in his asset base.

There are a lot of problems with what is being proposed today. There are a lot of things we would like to see changed in the enterprise to make it operate as a business.

They are in a competitive market and they want to behave as a business, and we say more power to them, but the primary goal of an American business in a capitalist system—and that is what we have—is to maximize the profit for the shareholder, and that is the taxpayer. It is not just to serve the interests of the nuclear utility industry or government contractors, which would like to get as much money as they can with no business risk.

Mrs. LLOYD. The utilities point to the fact that DOE was charged with recovering its cost over a reasonable period of time. They also allege they have provided full cost recovery to DOE with the exception of some $364 million.

Now, they determined this, Mr. Montange, by simply adding and subtracting the costs and revenues from the enrichment process.

Now, is this a fair method to determine what the costs have been recovered from the enrichment customers? If not, why not?

Mr. MONTANGE. Well, the way that they get to their amount is they assume that it is proper for the U.S. Government to simply donate all the assets to the program. The civilian enrichment program—first of all, my broad answer is that whole utility argument is massive historical revisionism.

It is comparable to the kind of Orwellian Dick Pot that occurred in 1984. The utilities in 1964 were supporters of legislation known as the Private Ownership Act. Under that legislation they understood that they were to pay and they represented consistently for about 20 years afterwards that they would pay the full costs of the Federal Uranium Enrichment Program. They acknowledged that that would include depreciation of assets transferred to the program and imputed interest on the investment.

The idea even at that time was there was to be no direct or indirect subsidy by taxpayers to the program. It is massive—it is an indirect subsidy if I furnish the plant for business. If General Motors comes in and says, well, we would like to operate another car factory here, will you build us our plant and write it off so that we don't have to do it, that is a Government subsidy. See, that is not full cost recovery.

What the utilities are saying is we now, 25 years later, think you should have donated that to us, and if you had donated it to us, then we only owe $364 million because the depreciation you charged really wasn't owing by us, and thus when we asked you to reinvest it, that also wasn't an additional loan, if you will, for our benefit.

Now, theirs is a kind of accounting gimmick, if you will. Theirs is the argument for an indirect subsidy. That is the best that can be said for it.

Mrs. LLOYD. If DOE cannot recover all of the capital investment plus interest in the enrichment business because DOE will simply lose its customers if it attempted to do so, what can Congress do to change the obvious result?

Mr. MONTANGE. Yes. The consistent NTU position on that is that the objective of Congress at this point, if full costs cannot be recovered, is to minimize taxpayer losses.

The best way to minimize taxpayer losses is to try to insulate the enterprise from the kind of—from an environment in which all of the incentives are to engage in subsidy to merely focus on cutting prices to please your constituencies, your customers, and the contractors.

What we believe that the agency should be directed to do and rewarded for doing is minimizing taxpayer losses.

Mrs. LLOYD. Very good.

Mr. Morrison.

Mr. MORRISON. Mr. Montange, I wonder, did your deliberations taken into consideration any of the military implications of uranium enrichments?

Mr. MONTANGE. No; my statements on the amount of costs that are owing are strictly on the civilian side.

Mr. MORRISON. OK. I guess I approach it with a little greater flexibility, in that these enrichment facilities were built for the defense of this nation and that if we spun off from that the ability to enrich uranium for electrical generation, that there have been some distinct advantages in both processes for us that sometimes cannot be allocated out to specific accounts.

Mr. MONTANGE. Well, Mr. Morrison, if I might comment on that just briefly.

The utility industry requested and obtained significant investments in the upgrade of the gaseous diffusion plants and in the construction, later canceled, of the gas centrifuge plant, which totaled billions of dollars. Those were strictly for civilian needs.

The U.S. military needs now I believe are 3, 4, or 5 million SWU per year, which is an insignificant portion almost of DOE's total capacity.

Mr. MORRISON. I do know that there continues to be some intermixing between the military aspects and investments in research and development that are important to us as a nation.

For instance, in your testimony you indicate DOE has recently announced it will face over $80 billion in unfunded liabilities for environmental remedial action. The largest block of that is in my district, and I can tell you we are proud that that was part of the price for peace, and I presume taxpayers don't mind or are not unwilling to share that cost.

Mr. MONTANGE. Well, obviously if it is a military expenditure, then we acknowledge that that falls on the lot of the public to bear.

The only caveat I would put on that is the general National Taxpayers Union concern that merely labeling a program a defense program should not then itself amount to a blank check to overcharge or overburden the U.S. taxpayer with unnecessary expenses, and I am sure you would agree with that, Mr. Morrison.

Mr. MORRISON. Absolutely, and I think the nice thing, no matter whether, you know, we end up being defensive on this or not, I have a note saying that the last GAO reports said that it was prudent to apply current standard accounting principles by writing off a large portion of capital investment. Any corporation would do that, and I guess we are asking an investment we have made as taxpayers to be handled in the same way.

The nice thing is the bottom line for all of us is the same. We would love on this subcommittee to be part of an enrichment program, and I think we are headed in that direction, that in fact can maintain world leadership and pay back to taxpayers some of the investment they have made in developing the program to that point.

Mr. MONTANGE. Well, Mr. Morrison, the National Taxpayers Union was, speaking for its representatives here today, pleased to hear some of the statements that Mr. Sewell made, and there certainly is room to work together, we hope both with DOE and with this subcommittee, in trying to iron out a common position on as many of the areas of dispute as possible, and I informally invited Mr. Sewell to set a meeting date so we could sit down and talk with him.

Mr. MORRISON. I will certainly tell my taxpayers you were here fighting for them.

Mr. MONTANGE. I hope successfully.

Mrs. Lloyd. Mr. Smith.

Mr. Smith. No questions.

Mrs. Lloyd. Thank you very much for being with us today.

If there are no further comments, the Subcommittee stands adjourned until 9 in the morning.

[Whereupon, at 3:30 p.m., the Subcommittee was recessed, to reconvene at 9 a.m., Thursday, February 23, 1989.]

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